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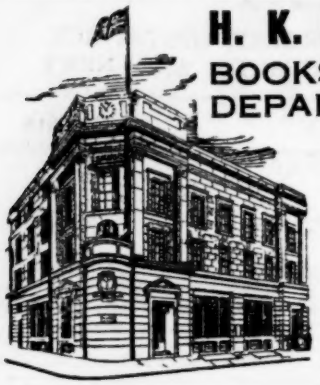

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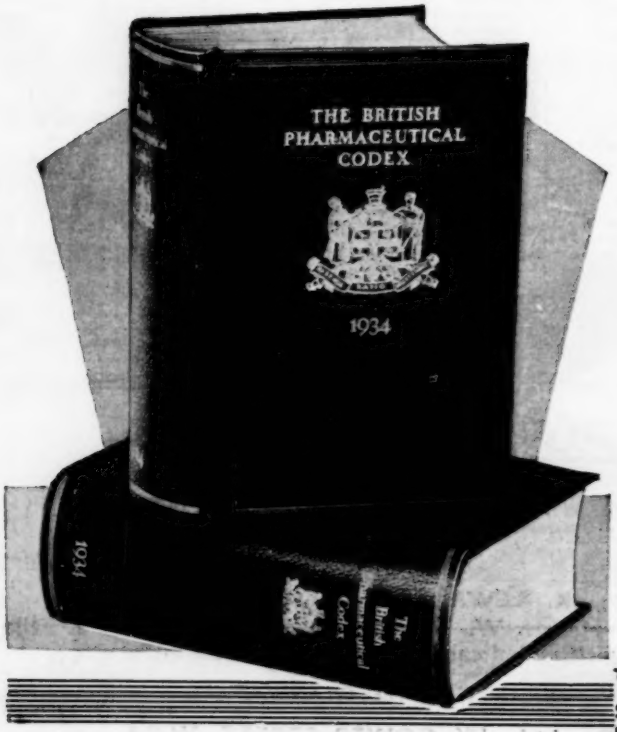

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ADDRESSES AND ORIGINAL ARTICLES

PRURITUS *

By Lord Horder, K.C.V.O., M.D., F.R.C.P.
PHYSICIAN TO ST. BARTHOLOMEW'S HOSPITAL, LONDON

It is generally agreed that the method of perpetuating a man's memory by means of an annual oration dealing with some aspect of the subject to which he devoted his life is a good one. The decision of the council of the London Dermatological Society, therefore, to call this address by the name of the man who founded it twelve years before he died, is very apt. Upon the great contribution to dermatology made by Robert Prosser White I need not dwell; is it not written in that really extraordinary book that he has left behind him, a book which holds deservedly the first place in the literature of Occupational Diseases of the Skin in our language? The book is not only extraordinary in the lucidity and conciseness of its text, and in the internal evidence which this gives of the author's extensive and intimate knowledge of the subject, but it is extraordinary also in the wealth of its foot-note references, which serve as a complete bibliography for those who are interested, and who engage in research in this important field. It serves as a model to all those who attempt a similar task.

If I had known, at the time I received the Council's invitation to deliver this address, the distinction which attaches to the names of those orators who have preceded me, it is very doubtful if I should have accepted it. Now that I do know I am comforted a little by the reflection that the relation of general medicine to dermatology is a very close one, a fact which Sir Humphry Rolleston emphasised when he gave this lecture nine years ago. I read into the invitation a feeling on the part of the Council that the Fellows of the Society should be reminded of this relation from time to time by choosing as orator one whose outlook is upon medicine as a whole, rather than upon disorders of the skin as a specialty. It is not for me to comment upon the wisdom or otherwise of such an action, though it is obvious from the fact that I have never specialised—but yet have got a great deal of interest out of the study of clinical medicine from a general standpoint—what view I should take if I were asked.

General Medicine and the Skin

The skin is an organ of such great importance, both to the body and to the mind: is so responsive, both in its nerve supply and in its circulation, to changes happening in the viscera, the musculature and the skeleton: expresses so quickly and so concisely, by its own peculiar set of reactions, most of our emotional states: demonstrates so promptly its resentment at being required to eliminate poisons which are introduced into, or are elaborated within, the organism: that to detach it entirely from the rest of the body, and study it in this state of detachment, does a great disservice to clinical medicine. This tendency to complete detachment is less marked to-day than it was one or two decades ago. Prior to that period diseases of the skin found a section in every text-book of medicine. Then for a space of time this section was deleted from a good many manuals. To-day, for the most part, it has come back again. The same story might be told of disorders of the mind. Even the public, an incorrigible believer in specialism, when disappointed with the results of treatment based upon the principle of detachment, presents us more often than formerly with the problem of a tiresome skin affection because it feels that a study of what is termed "the general health" may possibly lead to a therapeutic clue. And by no means always in vain. This leads to what the children call "fun" for the general physician. Better "fun" still for the dermatologist, when, remembering the close linkage between the skin and the rest of the body, he cures not only the skin disease which brings the patient to him, but the corporate malady of which the skin defect was but a manifestation. That the dermatologist should be a general physician in training and in outlook, as well as a skin doctor, is even more necessary than that the general physician should have dermatological instincts. Were it practicable, and it sometimes is, every intending skin specialist should be put in charge of a medical out-patient department for twelve months. The general physician is equally fortunate if he has been in charge of "skins" for at least the same period. What is true of the clinical side is equally true of the pathological side of skin diseases. There is, as we know, a special morbid anatomy of the skin, as there is of all the organs of the body, but we can never hope to understand this, nor its significance, unless we remember the unity of pathological processes in general and the ease and frequency with which the pathology of the skin is affected by them.

I would take this point a step further. Our outlook should be more and more general, less and less local, whether we are concerned with the causative, or with the therapeutic, factors in skin diseases. It is often advanced that in the sphere of skin pathology the study of local irritants forms a prominent part of the investigation. True, but though the irritant may be simple and known, the mechanisms activated by it are frequently complex and obscure. Effects are perhaps more disproportionate to causes in the case of skin affections than anywhere else in the whole body. Though the causative agent may be established beyond doubt there is not infrequently a depth and an extent in the chain of resulting pathological effects which baffle our most painstaking research.

Reflections such as these seem a desirable preface to the few remarks which I propose to make, not without some timidity, on the subject of pruritus. Itching is the most common symptom of disease of the skin. But itching may be regarded as almost a normal function of the skin in health. It is one of those sensations which lies in the borderland between health and disease. We may say that itching passes from the physiological to the pathological when one or both of two things happen: when lesions, microscopical or macroscopical, appear in the skin as the result of scratching or rubbing, and when a person's rest is disturbed by the process and especially when sleeplessness occurs from undue persistence of the sensation. There are analogies to this. To sneeze is physiological, to sneeze twelve times in rapid succession is pathological. A moderate degree of itching is pleasant, or rather, the relief afforded to a moderate degree of itching is pleasant, is satisfying. It is told of Carlyle that when a sententious young disciple of the sage asked him "what is the height of human happiness?" he replied, "To scratch the part that itches."

All the world itches, but for very different reasons in different persons. He who sweats too little itches,

* The Prosser White Oration delivered before the St. John's Hospital Dermatological Society on June 26th, 1935.

and he who sweats too much. He whose habits are dirty itches, and he who is cleanly to a fault. It may be presumed that not all tramps itch—or not distressingly to themselves—but my Lady Vere de Vere certainly does not always escape by the frequency and complexity of her toilet. Pruritus may be general or local. It is the merest tyro who supposes that general pruritus is due to general causes and local pruritus to local causes. I am quite sure that pruritus ani, one of the most tiresome forms of pruritus, may be of entirely general origin, and this *pace* the proctologist, who, not unnaturally, takes the very opposite view and believes all cases arise from local causes. On the other hand a single acarus in its burrow may give rise to very extensive pruritus. When the cause is a general one as, say, in gout, the site of a local pruritus may often be determined by some local defect, but this is frequently so trivial as to go often entirely undiscovered. I will allow the dictum that if a pruritus be general the cause is more likely to be general than local, but my experience warns me strongly against the converse statement, that a local pruritus is more likely to depend upon a local, than upon a general, cause.

General Causes of Itching

Amongst the more or less obvious, and serious, general causes of pruritus are diabetes, uræmia, and leukæmia. Jaundice is another, but not necessarily such a serious, cause. Pruritus in Hodgkin's disease is less known, but it is sometimes such a marked symptom here that its presence may be helpful in diagnosis, seeing that it does not seem to occur in that form of tuberculous adenitis which not infrequently conflicts with lymphadenoma. Pruritus occurs in hyperthyroidism, both with, and without, skin lesions. It also occurs in pernicious anæmia and in other conditions involving hæmolysis. I have met with two very troublesome examples of it after splenectomy, accompanied, in one of the cases, by urticaria. Though it is usual in these days, when the microbic hypothesis still holds such sway in our minds, to search for "focal sepsis" in all cases of generalised pruritus, convincing evidence of the causative association of the two conditions is less often forthcoming than is usually taught. The most common forms are dental and gall-bladder sepsis and chronic colon bacillary infection of the urinary tract. Pruritus must be quite unusual in tonsillar sepsis and in sinusitis.

Since the term "intestinal toxæmia" connotes at least three different pathological processes, to say this is a common cause of pruritus tells us nothing definite. (i) The ingestion of certain substances to which patients are "sensitised" is very likely to cause pruritus, a matter to which I shall return later. (ii) Bacterial sub-infection of the bowel may cause pruritus, but the association in a causative sense is almost impossible to establish. (iii) The doctrine of "copræmia," meaning the absorption into the blood stream of certain retained products of fermentation from food principles, has never been submitted to scientific research. Even the statement, so commonly made, that constipation is a frequent cause of pruritus, may be challenged. I have met with several patients who developed pruritus after fiddling with their bowels, though it is extremely difficult to say, in such cases, if the itching is the result of an abnormal degree of absorption from a more frequently denuded mucous membrane, or of the chemical agent used as an aperient.

Of all the general causes of pruritus, however, the most common is "gout." Did not an ancient physician call itching "the lisping of the gout?" The word is, as we know, somewhat *démodé*. But to rid medical nomenclature of the word "gout" does not rid medical practice of the gouty patient. Acute articular gout is, no doubt, far less common than it formerly was: so much less common indeed, that when it appears it not seldom fails of recognition. But goutiness is as common as ever, if not commoner. But what *is* gout? Is it an entity? Is it one thing or is it several things? The time is not ripe, even now, for answering these questions. We know what gout is *not*: it is not poisoning of the body by uric acid, still less is it due to a deposit of biurates in the tissues. It seems probable that there is a basic pathological process in all cases, but the vagaries introduced by the individual equation are so numerous and so important, that we must almost consider each man's gout to be his own, and study it as such, if we are to achieve a therapeutic success. What structures in the body are mainly concerned in this postulated basic mechanism is largely a hypothetical question. That the liver looms large in this field seems probable. Yet we may find, later on, that the dominant tissue is not this, but something more subtle, and not as yet revealed. The discovery of the reticulo-endothelial system and its influence upon the blood-forming organs suggests strongly that we have by no means exhausted the discovery of tissues and tissue functions by combining histological with metabolic research.

Allergy

The relation of goutiness to allergy is as yet undetermined but that there is some close association seems highly probable. The concept of allergy, originally much too limited in its application, has probably become to-day much too unconfined. Or perhaps it is more true to say that the notion has far outstripped the facts—a way that all new notions have. Richet's fundamental observation of the phenomenon which he called anaphylaxis gave clarity and cohesion to a large number of clinical experiences. But until we know much more about the exact happenings in the production of this state of sensitisation we cannot say how wide its application may be. It seems probable that in the case of the skin the doctrine of allergy is applicable to many more conditions and to many more patients than is generally supposed. Urticaria and its ally angeio-neurotic œdema, with some forms of eczema, especially in children, appear to cover the allergic group of skin affections in most books dealing with these matters. Just as the dramatic syndrome termed asthma, with its ally, hay-fever, seem to absorb the same attention in the respiratory field. I think most cases of lichen urticatus should be included in this group, and in this connexion I would add, incidentally, that this disease is by no means confined to children, as many authors suggest. I am equally confident that a great deal of pruritus, both general and local, whether associated with demonstrable lesions or not, also deserve inclusion, in addition to the itching disorders already mentioned.

The fact that serum-sickness has frequently an incubation period of 8–10 days goes to show that considerable latency may exist between cause and effect in pruritic diseases, though it is true to say that when the irritant is inhaled, or is absorbed from the alimentary tract, the evidence of sensitisation is usually much more rapid. There are some general considerations of importance which suggest themselves in this connexion. (i) It is too often asserted, and dogmatically, that the allergic patient is sensitised specifically. But there are many individuals who are sensitised against a large number of substances, and

this fact introduces great difficulties both in diagnosis and in treatment. (ii) The question whether the irritant in allergic patients is always a protein is supposed to be settled in the negative, the experience of drug idiosyncrasies being adduced in support. But the argument is by no means so simple as this. If drugs do good indirectly, as we know many do—the arseno-benzol group for example—it is just as likely that they do *harm* indirectly, setting free some protein fraction in the circulation to produce allergic effects in the skin or elsewhere. (iii) Not only are some individuals sensitised to a number of different substances, they may show their allergic tendency in a number of very different ways. And those ways do not always alternate, as do the classical examples of eczema, asthma, and certain forms of arthritis. The most catholic example amongst my own patients is a man who became sensitised after small-pox vaccination with suppuration under the scabs, at the age of 25 years. He suffers from both paroxysmal rhinorrhœa and stuffy nose. He has had several attacks of acute articular gout, being awakened in the early morning with an excruciatingly painful, pink, glossy and swollen foot. A small dose of medinal keeps him awake all night with severe urticaria. Beer, chicory, the whisky of some of his friends (but not all, and he keeps a list of these), and some ingredient in Worcester sauce which is not in any of its competitors keep him equally restless and sleepless with intense pruritus ani. He was once stung by a wasp and collapsed instantly, requiring volatile stimulants and other restoratives.

The Nervous Factor

The last of the general factors to touch upon but, in some respects, the most important, is the nervous factor. The overlap of the nervous factor with both gout and allergy is considerable. But the influence of the nervous system upon metabolism is too large a subject for this address if, indeed, it be not too large a subject for any single address. The introduction of the word "neurotic" by Quincke into the designation of the disease which bears his name is fully justified by a study of the cases. Even though the allergic factor in this and other skin diseases is established, this does not minimise the importance of recognising the element of nerve instability in many of the patients affected. Sometimes this instability is central, sometimes it is autonomic, sometimes both. Here again, each case must be taken on its merits. We must avoid the stigma that the use of the word "nervous" often conveys to a sensitive patient; or if we use the word, or condone it, we must explain that it by no means necessarily reflects upon the patient's behaviour or has any moral significance. If confidence be needed, we may cite examples of men and women who have made great contributions to life and yet who suffered from some form of neurosis. But the patients who possess a central nerve instability, who are psychotic in fact, present a problem of their own. To help them we cannot know too much about them, soul as well as body. To have it said of a medical man: "I found myself telling him everything" is a good compliment. And to create the atmosphere that makes self-revelation easy, indeed, makes self-revelation inevitable, is the acme of good doctoring. If, now, the process can be continued and completed by the same doctor, in the same room—even if the exigencies of practice do not make it possible that it should be continued at the same time—without the break introduced by an appointment made at a new address, with a new doctor bearing the ponderous title of psychotherapist, so much the better. Organic diseases of the nervous system lead to rather surprisingly few instances of pruritus, and it is only want of care in attending to the patient's description of his dysæsthesiæ that leads to a misinterpretation of these in terms of pruritus in (say) an early case of subacute combined degeneration.

Of local causes of pruritus I do not propose to treat in detail. Charles Lockwood, a man to be remembered as much for his gift of teaching as for his poineer work in aseptic surgery, was wont to exhort his pupils "always" to "examine the part the patient complains of." The injunction seemed superfluous, almost silly, and yet the most careful amongst us are now and then found to be negligent of this very trite advice. The reminder applies with tremendous force to affections of the skin, and to remember it in a difficult case of pruritus saves us from many a pitfall. All the same, it is pertinent to repeat here what I have already remarked, that there are few cases of local pruritus in which a general factor is not present.

Treatment

I have sometimes been as guilty as Lockwood in the matter of obiter dicta, and I do not disclaim plagiarising the description of his art attributed to Demosthenes, by saying that the most important thing in treatment is diagnosis, the next most important thing is diagnosis, and the third most important thing is—diagnosis. To no complaint, again, does this truism apply more than to pruritus.

Having unearthed the ætiological factors, both local and general, we must deal with these as patiently and as persistently as possible. Always facing the patient with the imperative need for his coöperation. We cannot live his life for him; it would not help him in the end if we could. It is sometimes necessary to get a clear issue on the point whether it is really worth his while being free from his trouble. How much self-indulgence, for example, is he prepared to give in exchange for comfort to his skin? Here is not a question of his skin as symbolical of his life; we know about that; we know that "all that a man hath will he give for his skin." What he is prepared to give to avoid pruritus is quite a different proposition. In the majority of cases the truth remains that a man can have almost anything he wants in life if he is prepared to pay for it. Here he is called upon, not infrequently, to help in the diagnosis. If he be allergic he must keep a food diary, and take some trouble about it, too. He must brace his mind to the questionnaire put to him by his doctor, and he must be loyal in carrying out the régime prescribed for him, not omitting some item because it seems to him to be trivial or devoid of meaning. We soon discover the degree of his disability by his reaction in these matters.

Most patients, and quite reasonably, prefer artificial methods of therapy to natural methods, and those methods that have kinship to "direct action" in politics are the most attractive of all. But in the case of pruritus we have not got many remedies of this class on hand. Or certainly not for permanent, as against temporary, relief. In the allergic patient, for example, our available methods of desensitisation, both specific and non-specific, are at present very disappointing. In theory they are most convincing, in practice not so. Just as "knowledge comes but wisdom lingers," so does theory arrive but practice lag behind. And so we find that avoidance of the peccant substance, whether in the food or in the air, or the clothes or the furniture, though more bothersome,

is more effective. But this means care and trouble and—dare it be said ?—intelligence. And, as I say, the question arises: is it worth while? After all, just as "life is more than meat and the body than raiment," so a bout of itching, even to the degree of suggesting the inquiry "what is the doctor doing about it ?"—and most of the minor disturbances in life tend to raise the query in this soft age—may be a very mean payment for a good dinner, a cocktail or sherry party or the vanity of toilet powder and a fur boa. The position should be faced clearly and as clearly stated. Our function is to explain and guide, not to govern and control.

There are few cases of pruritus for which we cannot do a good deal and fewer still for which we cannot do something. I do not think there are any for which we can do nothing. The most intractable cases of all are those instances of diffuse itching which go by the depressing name of "senile pruritus." The use of this term stultifies our efforts at diagnosis, it does not add to our knowledge. In quite a number of these cases the patient is in many respects young, and not old, for his years, is of the alert and active type, and a close examination of his skin does not reveal evidence of that atrophy which is too often assumed to be present. On the other hand we frequently see skins that are definitely atrophied, in still older patients, with no such disability. The other statement, so frequently made, that the subjects of so-called senile pruritus are troubled by "imperfect metabolism" is another assumption, unhelpful from its very vagueness. Every one of these cases must be taken on its merits and thoroughly investigated. Of the underlying morbid conditions present in them, goutiness, an unstable nervous system and focal sepsis are perhaps the most common. The question of septic teeth involves the physician in the difficult dilemma that he cannot promise an adequate return from extractions, yet he knows that to follow established principles is his only safe procedure. Goutiness demands careful and individual treatment: no general advice can be volunteered. The most useful drug in the nervous type of pruritus is luminal, in as small a dose as produces effects. An older remedy is cannabis indica, but the drug seems to lack potency these days or, if trouble be taken to secure an active preparation, the patient is prone to complain of odd symptoms that alarm him—and he is too often the sort of person who is very easily alarmed

When, in a difficult case of pruritus, we have done our utmost in removing all possible local irritants and congestions; when we have placated the unstable nervous system; when we have brought the swinging metabolic pendulum to rest; when we have exploited the doctrine of allergy to the full; when we have tracked down focal sepsis to the last ditch; the pruritus may still persist. We have treated the disease and now our traditions, as well as our duty, demand that we treat the symptom, in this event itself the disease. To talk of unguents and lotions to an audience of dermatologists would indeed be taking coals to Newcastle; would add the insult of supererogation to the injury already done to your patience. I may be excused, however, for adding a few words concerning X rays, partly because the tendency to employ this therapeutic measure is increasing, partly because it is at times so strikingly effective, and partly to inquire if there be any dangers in the method.

Results of an Inquiry

So that what I may say on this subject shall not be only the result of my own experience, I recently canvassed five dermatologists and five radiologists for their views. I naturally chose colleagues whose practice is extensive and whose judgment I knew to be reliable. A composite analysis of their answers, for which I take this opportunity of thanking them very cordially, confirms my own opinion on the subject. It will not be a surprise to learn that the radiologists are, on the whole, rather more enthusiastic concerning this therapeutic measure than are the dermatologists. Nor that the degree of enthusiasm amongst both groups varies considerably.

I will state the conclusions of these experts in a few brief sentences:—

1. There is general agreement that in pruritus ani and pruritus vulvæ, and in other forms of localised pruritus, X rays frequently produce marked relief. The figures vary from 90 per cent. to 60 per cent.

2. There is general agreement that "cure," by which I understand is meant complete cessation of the symptom, occurs in a considerable number of cases. The figures vary around 50 per cent.

3. There is general agreement that in diffuse, as against local, pruritus, the treatment fails.

4. The majority use small doses, but a minority states emphatically that heavy doses are more satisfactory.

5. The note of caution is sounded by most, and the note is, again not unnaturally, rather louder in the case of the dermatologists than in that of the radiologists. One of the latter gives as his working rule: "if no response follows the first treatment, proceed cautiously; if no response follows the second, discontinue." He adds: "proceed with extreme caution when patients have already had X ray or radium treatment."

6. Without exception the dermatologists lay stress upon the importance of a complete diagnosis: the radiologists do likewise, either specifically or by assumption that their general medical colleague has already borne in mind the great importance of this point.

7. It is not without significance that the dermatologist who was the first physician in London to treat skin diseases by X rays writes the most depressing of the letters with regard to the question now submitted to him.

Where the experts find it so difficult to attain unanimity it is excusable for the non-expert to quibble. Perhaps the truth lies here, as it does in regard to many therapeutic measures: be bold, be bold—be not too bold.

THE COD-LIVER OIL TREATMENT OF WOUNDS

By John P. Steel, M.D. Edin.

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The annotation in The Lancet (1934, ii., 367) calling attention to the use of cod-liver oil in the treatment of burns and septic wounds by Prof. Wilhelm Löhr of Magdeburg, was of sufficient importance to warrant a trial of the method he described. Burns are seldom received at a hospital without first-aid treatment having been given outside, usually in the form of an oily dressing applied to the burnt area; for this reason the tannic acid method is not often applicable without extensive skin toilet, requiring in many cases a general anæsthetic. Picric acid is also extensively used for its analgesic properties, and tannic acid is not readily applicable on such

a surface. Where skin toilet was not desirable it was the practice in this hospital to follow the first-aid dressing by the application of liquid paraffin or sterile vaseline, as continued application of picric acid had led to unpleasant results in cases of idiosyncrasy.

The application of cod-liver oil seemed so easy a method and so generally useful that it was decided to treat minor burns in an endeavour to estimate its value, and the comparison was very easy between tannic acid and the other oily dressings. The accompanying illustrations will show that it was soon decided that the use of cod-liver oil was quite justified, not only in burns of a minor degree, but also in those of much greater extent and penetration. It has, in fact, been so successful that it is now almost a routine here to treat any burn with crude cod-liver oil. The main advantage is that, on admission, no matter what has been applied outside it is unnecessary to undertake any extensive skin toilet before applying dressings.

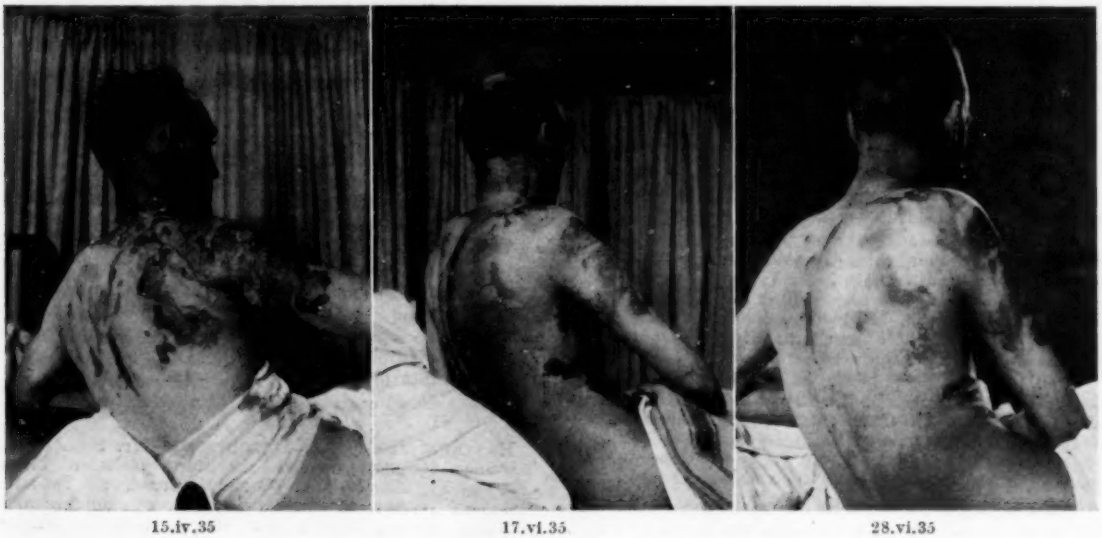
At first it was thought that cod-liver oil combined into an ointment with some waxy base would remain in closer contact with the burnt area, but it was soon found that the dressing, when the time came for renewal, was either dry or inclined to draw the granulated tissue away with the remains of the waxy ointment. To overcome this difficulty, lint, heavily soaked in cod-liver oil, was applied widely over the part to be treated, and was taken off at the end of 12 hours. With experience it has been found that once in 24 hours is sufficiently often to uncover the dressing, which is now left in situ and re-soaked with cod-liver oil, the lint not being taken from the skin surface until the end of 48 hours—an obvious advantage where the area to be treated is large.

Both Löhr and Winnett-Orr of Nebraska (THE LANCET, 1933, ii., 357) use the occlusive method, but the only occlusion that we have found necessary is to cover the dressing by jaconette, in an endeavour to keep the lint saturated. Crude cod-liver oil is used from the commencement in all cases. Where cases have not reacted previously to the ordinary dressings it has been found that cod-liver oil hastens recovery, and the speed with which an indolent area is transformed into one of healthy granulation is remarkable. The treatment too is popular. Almost every patient has said that the first application of cod-liver oil has given much greater ease than other dressings. One case, which is not illustrated, may be quoted.

10.iv.35 24.iv.35

FIG. 1.—Scald of second and third degree dressed with crude cod-liver oil.

A marine fireman, who was scarred in almost every part of his body, was burnt on the left arm, shoulder to elbow,



15.iv.35 17.vi.35 28.vi.35

FIG. 2.—Extensive burn from a fall into the fire similarly treated.

whilst five days out from Liverpool, by a fall against the door of the ship's furnace. He sustained a burn of the third degree which was treated by picric acid on the boat, and on arrival at port he was sent to this hospital with all speed. He was in considerable pain and there was a good deal of toxicity from the picric-acid dressings. Cod-liver oil was immediately applied, and in 12 days he left the hospital with a completely healed surface and without any scars.

By a strange coincidence about 15 days later, on his return to port, he was sent into hospital by his

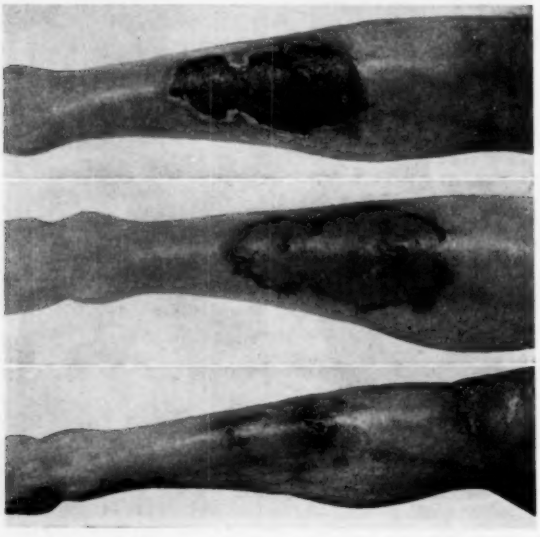


FIG. 3.—Septic ulcer similarly treated. The photographs were taken on 30.iii., 4.iv., and 20.iv.35.

panel doctor for an acute intestinal obstruction, and it was found that not only was there no scarring from the recent burns, but the brown pigmentation, which is so often left after this treatment, had entirely disappeared. Another case confirms this opinion.

A woman, aged 25, had been in hospital for more than two and a half years as the result of extensive burns caused through falling into the fire at home. She had been treated by varying methods over a period of two years, and extensive scarification had taken place to such an extent that her chin is pulled down at least 1½ in. towards the chest wall. In the areas where no actual healing had taken place skin grafts were attempted but did not take. Finally cod-liver oil was used on the sites where no healing had occurred, and we are now presented with a picture of islands of unscarred healthy skin lying in the middle of extensive scars.

Two cases of burns treated by Löhr's method from the onset may be briefly related.

A. B. (Fig. 1) was scalded over the whole of the left forearm to the second and third degrees by a pan of boiling fat, and was admitted to hospital on April 10th suffering intense pain. Dressed with cod-liver oil, he said the pain was at once relieved. He was discharged 14 days later without a vestige of a scar, and within a month the pigmentation had disappeared.

C. D., reputedly an epileptic, was admitted on April 15th and discharged on June 28th. His extensive burns were the result of a fall into the fire, and his progress under a cod-liver oil dressing may be traced in the photographs (Fig. 2). He was discharged with nothing but a dry dressing. No scarring followed even in so extensive a burn as this.

With such good results in burns, it was decided to try crude cod-liver oil as a dressing in other cases. Indolent ulcers and deep abrasions were so treated, but always following the rule "if there is pus, it must be let out." With this proviso cod-liver oil treatment has been found of advantage in a great number of slow healing areas. After the removal of pus or gangrenous patches of skin, oil applied in the way described has induced rapid granulation of tissue previously indolent in leg ulcers and even in fistulæ. One case of fistula had been in hospital 34 days under routine treatment and still showed a slight serous discharge. After packing the wound for six days with cod-liver oil the patient was able to leave hospital, and only needed to make two out-patient attendances for the renewal of the dry dressings. Fig. 3 shows how rapidly granulation is induced.

E. F. had a septic area on the leg for three weeks whilst at sea; cellulitis and sloughing of the skin of the right foot had developed. He was in hospital 17 days under cod-liver oil and left almost entirely cured. On reporting one week later nothing was to be seen of the wound save a slightly red pigmentation which disappeared in a few days.

Unless the distal and proximal surfaces of a joint are involved no immobilisation is undertaken and no occlusion is attempted except that obtained by a covering of jaconette. Crude cod-liver oil is used and is applied by lint saturated therein. The dressing is not removed for 48 hours, but at the end of the first 24 hours—or more often if it seems necessary—it is re-soaked in situ with cod-liver oil. In certain cases at the end of a week the granulations are found to be exuberant; cod-liver oil dressing is then replaced for 24 hours by red lotion or a paste with a zinc base.

The only disadvantage of the treatment, as noted in your annotation, lies in the somewhat unpleasant smell from the dressing, but this can be mitigated by frequent change of bed linen. At one time we included an aromatic in the oil, but gave it up as it did not seem worth while. Sometimes the scent of the oil seems to make a patient less ready for his food, but this mild nausea soon passes away. The advantages are obvious: the ease which the patient obtains from the first dressing, the abolition of frequent change of dressings (with consequent pain and disturbance to the patient), and the almost total elimination of scar tissue. The brown pigmentation which is found on the healed skin clears up without further treatment.

A laboratory comparison was made between liquid paraffin and cod-liver oil, 10 c.cm. of either being inoculated with *Staph. pyogenes aureus*. In the case of cod-liver oil after 48 hours' incubation, subcultures on agar proved that although the organisms were still alive the growth was inhibited. The same result was obtained with liquid paraffin over a week. Obviously neither is a suitable medium for the growth of the organisms, and this will account (as Löhr reports) for the change of an unhealthy surface into the "clean ruddy picture of healing."

Whether the vitamin content in cod-liver oil has a natural affinity for the skin and the underlying tissues it is difficult to say, but there is obviously some factor in cod-liver oil which is not present in such oily dressings as liquid paraffin. This "something" has the effect of much more rapid healing and the almost entire elimination of scar tissue.

EASTERN HOSPITAL, HOMERTON.—Mr. Somerville Hastings recently opened the new isolation block erected by the London County Council at Eastern Hospital, Homerton. It is a two-storey building and provides accommodation for 60 patients in single-bedded wards.

NEUROSIS AND UNEMPLOYMENT

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Much has been written about the "industrial neuroses" that follow accidents for which compensation can be claimed, and about the "war neuroses" in which pensions play a part. The effects of unemployment upon the mental state have also been much spoken of in the last few years. There are, in short, generally recognised conditions in which social influences seem to play an indispensable part in provoking mental illness and so maintaining social incapacity. But since these social influences act upon many more than the few who respond with neurosis, it is important to see what other predisposing factors are at work in these few, as well as the social and clinical consequences of the adverse circumstances.

A special group was available for such inquiry. A series of patients on out-relief had been seen in whom presumptive mental disorder, generally of a mild chronic kind, was associated with long periods of unemployment. They were referred to the Mile End Psychiatric Clinic by the local public assistance committees (P.A.C.) for an opinion as to diagnosis and treatment. Fifty-two successive male cases, so referred between May, 1931, and June, 1932, have been taken for study. They do not form a representative group of people on out-relief, nor perhaps even of those on out-relief who had been diagnosed as neurasthenic, for the process of referral was not a routine one but depended on selection of appropriate cases by the various district sub-committees of the P.A.C. In age they ranged from 20 to 67: seven were between 50 and 65, thirty-two between 35 and 50, thirteen between 20 and 35. The information about them was obtained by the following inquiries:—

1. A social history was obtained from a relative of each patient, prior to his attendance at the psychiatric clinic, by a psychiatric social worker.
2. The P.A.C. supplied details of medical history in most cases.
3. The psychiatrist examined the patients on one or more occasions and recorded the findings.
4. The case papers of the P.A.C. giving the whole history of the patients' relations with the administrators of out-relief, under the guardians' régime and that of the present P.A.C., were put at the disposal of the psychiatric social worker. The relieving officer who dealt with each case was interviewed in person.
5. In 49 of the 52 cases the psychiatric social worker visited the patient's home at a later date, saw him, his wife or a relative, and ascertained the subsequent happenings.

Only a brief account of the voluminous data accumulated can be given here. For them I am indebted to Miss M. A. Lane, the psychiatric social worker attached to the clinic, and to Miss Janet Galloway, who as research social worker at the Maudsley Hospital has studied the social aspects of this matter fully; her findings are being published elsewhere.

The Clinical Features

The clinical pattern was remarkably uniform. It was that of a chronic neurosis in which hysteria predominated. Various combinations of anxiety, irritability, hypochondria, depression, querulousness or resentment, and (hysterical) conversion symptoms were found; often all of these would be discoverable, and seldom less than four. Outstanding features were a preoccupation with discomforts, whether expressed in physical, mental, or social terms, a feeling of dissatisfaction or resentment in regard to them, and various expressions of anxiety; trembling was frequent. The complaints were commonly vague, but expressed with great earnestness, often also with rich prolixity and as though learnt off by heart. Sometimes these complaints verged on the bizarre—e.g., "when I eat the food it gets just here and it keeps on boiling and wind, and after my food this right leg of mine goes dead .... Like an acid it keeps on fermenting in my mouth. And the wind works round me here. And it goes dead, I got no feeling. And this fluid seems to work all through my body, this acid boiling up: all my food seems to go to it .... White stuff dries in my socks .... Then when the doctor stroked the soles of my feet, he struck the delicate spot and it ran all up my leg ..."

A majority had a grievance against the pension authorities, the public assistance committee, medical boards, or society at large—"the capitalist system." This was not expressed as a delusion but as a general attitude of touchiness and resentment, which would perhaps be evoked in a previously friendly and deferential patient when one asked him what standard he had been in when he left school, whether he had a pension, what work he had been able to do in the last two years, whether he had used any form of contraception, and so on. In 17 of the patients this attitude was very evident, and had at some time led to more or less severe outbursts of rage or violence. Convinced assertions of victimisation, made in apparent calmness, were never obtained, and the patients showed, to express it in psychiatric terms, a paranoiac reactive development of personality, rather than a paranoid delusional formation.

Irritability was commonly complained of, or was reported by the patient's wife; it was always associated with some depression. Depression was observed and reported in 30 of the patients, but (like all the other symptoms mentioned) may well have been present, though at the time of examination unobstrusive, in many more. It rarely was extreme and in no instance was it associated with self-reproach or delusions. It is remarkable that in a few of the men it was apparently not the case that they were depressed; they were cheerful, in spite of the shaking and other discomforts, they slept and ate well, and their general manner suggested that they were content. It would of course be unwise to assume that these patients were happy or that their general mood differed greatly from that of many others who were said to be, or professed themselves, depressed, and who wept or looked glum—though unconvincingly—while reciting a catalogue of queer feelings and tremors.

The doubtless complicated and equivocally shown attitude of these men towards their situation and their symptoms cannot easily be expressed in simple affective terms, such as "depressed," and their affect was not so sweeping and unvarying as in the familiar psychiatric disorders of mood; it corresponded more to the instabilities of psychopathic personality. Anxiety was a common feature among the patients; in 28 it was conspicuous, and in almost all demonstrable. The modes of its manifestation varied; clear-cut anxiety attacks, not obviously occurring in terrifying situations, in which the somatic expressions were brief, widespread, and "classical"; or sweating, trembling, and dread before medical

examination and other more or less important occasions; or constant restlessness and ill-defined apprehension occurred, as well as localised anxiety in which the activity of the heart or other organ was the centre of anxious preoccupation. Phobias—e.g., against crossing the street or riding on a bus—were not infrequent. Tremor was one of the most common findings; it was striking in 23 of the patients and was observed in most of the remainder; it was in many cases obvious to the casual glance—coarse, uneven, with jerkings or twitchings of the head and trunk as well as of the extremities; and in a large number it was the chief symptom complained of. Where it was a fine tremor other evidence of anxiety was present: where coarse or odd, less of general anxiety and more of interest in the symptom was the rule.

Three of the patients showed a mild pseudo-dementia, professing not to understand questions or giving inappropriate answers; they were unintelligent men who resented questioning, and their behaviour may perhaps be regarded as an intentional effort to mislead the examining physician. One patient had had a fugue, and he fell about when he walked: two others had a gross, anomalous stammer. These were all hysterical phenomena. Five of the patients were chronic schizophrenics, and 3 of these had been in mental hospitals: in none of them were the symptoms recent, the onset had been at least 7 years before: it is unnecessary to describe the symptoms they showed, which included affective incongruence, characteristic thought-disorder and paranoid hallucinations. There was one epileptic patient, and 6 in whom arterio-sclerotic changes were present and seemed contributory to some of the "mental" symptoms—e.g., lacrimose expressions of anxiety. In one patient a diagnosis of cortical degeneration, possibly of vascular origin or conforming to Pick's disease, was made.

Causal Factors

On a careful survey of the history of each of these patients, one could understand how the present illness had developed. This way of thought, however, can be deceptive since it ignores the alternative modes of response to those taken by the patient and is willing to leap over unknowns: it may be no more than fitting the data into one's preferred scheme of mechanisms and consequences. It is however the most satisfying and profitable way of regarding the individual case clinically. In distrust of this clinical approach, one may look for the common occurrence in these patients of presumptive causal factors, or to put it more correctly, for biographical data which characterise this group, and to some extent differentiate them from people with other illness, or from healthy people. Unfortunately, on many of the points investigated in this series, comparable data for the rest of the population are not at hand.

In this group, therefore, it was not so much the "causal" factors but rather the common peculiarities that were examined—these were concerned with social and medical facts and extended over more than the individual history of the patients.

THE FAMILY

The fathers of the patients had in 26 of the 45 known cases been unskilled workers; in these 26 the size of the family to which the patient belonged was nine children, whereas it was seven children in the 19 cases where the father had done skilled work. There were 7 instances in which a parent or sibling of the patient had been for years in a mental hospital: in these relatives schizophrenia, involutional melancholia, and mental defect were the diagnoses, while in all of these 7 patients themselves there was some departure from the clinical picture presented by the majority: in 1 there was extreme hypochondria of a bizarre sort, in another a paranoid psychosis, 2 were schizophrenic, 3 were mentally defective. It is very probable that the details obtained about the family history were incomplete, so that an appraisal of the findings might be misleading. The further information under this head is as follows: in 5 of the cases "nervousness" in one form or another (mostly anxiety states) was reported in parents or siblings: alcoholism in 7, in 3 asthma, in 4 epilepsy. In 8 patients, tuberculosis occurred in other members of the family. All these facts are probably underestimates. The parents of 4 of the patients had lived apart; 3 patients were brought up in an orphanage, and 1 who was illegitimate had been brought up by a foster mother; one of their parents had died during the childhood of 8 of the patients. The places of the patients in the order of births did not appear significant, collectively.

PREVIOUS EVIDENCE OF NEUROSIS

In 12 cases there had been in childhood neurotic traits, such as shyness, extreme sensitiveness, restlessness, somnambulism and day-wandering, unmanageableness, nail-biting, incontinence of urine and fæces, facial tic, and fits. During adolescence one had been delinquent, another had had fits. Serious ill-health in childhood appeared to have had a considerable influence on development in 3 cases. In 23 of the patients there had at some time been overt evidence of mental illness. Thus half the patients who had been in the army during the war were discharged with the diagnosis of shellshock, neurasthenia, or D.A.H.: almost all of these received pensions, for a time at least. Ten of the 25 non-army cases had shown some anomaly (epilepsy in 2 cases, delinquency in 2, neurosis after trauma in 3, and single instances of other disturbances). The physical health of the patients during adult life is considered below. In the work record and war service of these patients significant hints or plain evidence of neurosis appear.

OCCUPATIONAL HISTORY

Two thirds of the men were unskilled workers, a higher proportion than was found among claimants for unemployment benefit by the Ministry of Labour in 1925 (51 per cent.). In 11 of the cases the father had been skilled, the son was unskilled; in only 5 did the reverse hold true; in 7 both father and son were skilled.

Owing to the varied ages of the group, the facts about working life and duration of unemployment could not easily be compared. For various reasons it seemed best to estimate first the individual efficiency of each patient prior to his first post-war application for out-relief: 14 of the cases could not be so treated because of their youthfulness and brief period of industrial life. Of the remaining 38 there were 26 with satisfactory work records—i.e., they had held one job for seven years at least, or had not changed their jobs frequently without improvement of status. Seven of the 12 men who had unsatisfactory records in this respect had previously applied for out-relief (i.e., before the war), and the other 5 had aimlessly changed from job to job and might be called "feckless" or unsettled.

As there was a rapid increase in unemployment and dependence on out-relief in London between January, 1920, and January, 1923, with its peak in 1922, it might be supposed that extraneous factors

had played a large part in bringing about the unemployment of the group under consideration. Actually the highest number of them applying in any one year did so in 1920, before the difficulties had reached their maximum. Of the total 52, 36 had applied for relief a year before the height of the out-relief figures for East Londoners as a whole had been reached.

In each case the reason for the application for out-relief had been inability to support the family because of inadequate or no earnings. Actual illness and particularly neurosis had not been given as the reason for loss of occupation. It must however be remarked that 36 of these 52 men had on one count or another previously shown some inadequacy: they had been diagnosed as neurotic (24 cases) or as mentally defective (3 cases) or had experienced the "pension situation"—i.e., had had some income, which was not current earnings, in the form of war pension or pre-war out-relief. Nineteen of them during their unemployment received National Health Insurance benefit for varying periods.

The amount of employment since the first application for out-relief is very little. Ten of these men have been unemployed for ten or more years, 34 of them have done no work lasting more than two weeks for the last five years or more. Half of them had been completely idle for the four years before their referral to the clinic, and only 6 had had more than a year's work during that time. One who showed mental defect, has never been employed at all. Eleven of the men have done no work for years except hop-picking in the autumn. The wives of 8 of them, incidentally, worked while their husbands were unemployed, but in only one instance was the work full-time.

WAR SERVICE

Just over half of these patients had been in the Army. Of the remainder, 10 were exempt because of their age, 4 were rejected as unfit, and 10 were either exempted or rejected on indefinite grounds. Of the 27 who were in the Army, 8 did not go overseas at all; 4 of them were discharged unfit soon after enlistment, and the rest were not called up until towards the end of the war. Nineteen saw active service; only 4 were discharged from the Army without any disability. Of the 19 on active service, 12 were awarded pensions, and so were 2 of the eight who were never sent abroad. Of the 14 pensions, 10 were for nervous disability, and 3 other men who did not receive pensions were similarly diagnosed neurotic on discharge from the Army.

It is evident that a large number of these men eligible for war service were either initially recognised as unfit to meet the stresses of war or later proved so.

PHYSICAL ILLNESSES

Physical illness had been recognised in 13 of these patients before their first post-war application for out-relief. In the individual cases the influence of this on general development seemed clear. Two of them had heart disease; in one case it was first diagnosed in adolescence, and in the other it has since brought about the patient's death. Two had had attacks alleged to be epileptic; others were tuberculous or had sustained injuries or were defective in some respect—e.g., crippled.

As the pension or compensation situation has so many analogies with out-relief in its possible deleterious effects upon personality and mental health, it is worth noting that besides those with Army pensions, 6 of these men have received compensation for injuries sustained since the war. Machine accidents to their hands and accidental falls had resulted in the receipt of a lump sum: in all these men neurotic symptoms had been evident before the happening, and probably they were more prone to accidents than is usual. Another patient injured one eye so that it had to be removed in 1930, at the age of 48: impaired vision in the remaining eye made work impossible. It is only since then that he has shown definite neurotic symptoms; he claimed but did not receive any compensation or insurance. Two other patients received compensation for injuries sustained by their children.

One of the patients when examined at the psychiatric clinic showed a presenile cortical degeneration; in 7 circulatory disorder (arterio-sclerosis in 5) was found responsible for some of their incapacity. Dental carries, pyorrhœa and arthritis were recorded in isolated instances.

It has often been said that the repeated medical examination of hysterical patients fosters symptoms. No clear connexion between previous examination and any particular symptom could be demonstrated in this group, though 4 of them quoted gloomy prognostications by consultants who had seen them, and many recited their symptoms with a readiness and uniformity of iteration that bespoke practice, and perhaps also iatrogenic acceptance of their incapacity.

Intelligence

Careful psychological tests were not practicable: information was drawn from the alleged standard reached at school and from the psychiatric observations made at the clinic. The school record could not be verified, unfortunately, as the necessary official documents had not been preserved except for special schools. The following numbers may therefore be taken as minimal. Of the 52, 3 had attended special schools for the mentally defective, 13 others had not reached Standard 5 at school. On psychiatric examination 8 men were recognised as definitely defective in some degree: they had none of them been to school in the period subsequent to the passing of the 1913 Act, as had the 3 who were certified defective; if they had, several of them would probably have been certified. At the other end of the scale, 3 of the men were said to have won scholarships at the elementary school; none of them, however, had continued at school till sixteen; they had all done skilled work prior to the loss of their employment (engineer, grocer, petty officer). Only 12 men however had definitely reached Standard 7 or Ex. 7 by the age of fourteen. The proportion of people of poor intelligence here is higher than for the average population: the figures are, however, too small and incomplete.

Marital State and Children

All but 9 of the men are married. Their average age on marrying was 25½ years—i.e., two years less than Beveridge's figure for the general population. Eight were married before twenty, 18 between twenty and twenty-five, 10 between twenty-five and thirty. In 4, the marriage was definitely a failure (desertion cruelty, separation by consent). One could not be, sure whether others got on well together: in the majority it appeared to be tolerably so: many of the wives showed loyalty and affection, sometimes against heavy odds. The offspring of the 43 marriages numbered 221, of whom 182 survived. Well over a third of the children had been born since the first post-war application for out-relief. Of all the marriages, in only 16 cases had there been no addition to the family since going on out-relief. There were 8 instances where four or more children had been born after the patient had gone on out-relief;

objections to contraception here played a large part, as 4 of the men in question were Roman Catholics and others expressed their dislike of any precautions. The average number of children was six for men over forty, and four for men under forty. The unskilled had larger families than the skilled. The proportion is the same as was found for the previous generation of these families and shows also the fall in the birth-rate: the average figures for size of sibship to which the patient belonged were 6·8 for the skilled, 9·3 for the unskilled: the corresponding figures for his own progeny were 4 and 5·7. An eighth of the surviving children, belonging to sixteen families, have abnormalities, thus 7 are certified as mentally defective, 7 have neurotic habits (e.g., enuresis), 4 have chorea, and 2 are tuberculous. On the other hand 9 children, belonging to seven families, have won L.C.C. scholarships for secondary or central schools.

Of the 43 married men 40 have dependent children. This figure has been compared with those given in the New Survey of London Life and Labour, and with others specially collected for this purpose from 150 married men, depending on public assistance, who were attending an East London non-residential training centre in the spring of 1933. Making necessary allowances for differences in age distribution (for the majority of the non-neurotic married unemployed were ten years younger than the married neurotic men under consideration) it appeared that the number of dependent children was higher for the neurotic group than for other unemployed. (The figures are given in Miss Galloway's paper.)

Social Conditions: Housing, Food

It is not difficult in individual cases to see how neurosis and unsatisfactory housing conditions may interact, aggravating or maintaining each other. To generalise would, however, be unjustified. The general facts as to housing are that the men formerly in skilled trades now live in poorer quarters than they would if working. The overcrowding among these patients is greater than for the average population in these districts: the comparable figures were obtained from the London Survey (Eastern Area) and for details Miss Galloway's paper may be consulted. The conditions under which they live seemed in many instances conducive to ill-health. As regards food, the outstanding observation was that the standards varied over a wide range among families with comparable allowances, the determining factor being apparently the care and intelligence with which the family money was laid out on food and other necessities.

Treatment and Outcome

Psychotherapy, treatment directed mainly at physical illness, and occupation were the measures employed. They were recommended according to individual needs, on grounds which need not be particularised except as regards occupation. The mentally defective patients, the schizophrenic and epileptic were dealt with appropriately. Of the various therapeutic recommendations none was so frequently made as that of occupation. In 41 of the patients it seemed to the psychiatrist that regular occupation, such as might be obtained at a non-residential training centre, would be of benefit. This rested mainly on two assumptions: (1) that most of their present symptoms were responses to lack of occupation, and (2) that appropriate occupation is beneficial for most varieties of mental disorder, including that which these men showed. It was recognised, however, that there were practical as well as theoretical objections. Training centres are intended in the first instance for the more promising and healthy man, who has a greater claim upon them than the weakling who has inherent deficiencies of personality and adaptation. The opportunities for the neurotic men were therefore fewer, even if they were eager to avail themselves of them. But they had in the course of years come to have an overtly or subtly hostile attitude towards occupation in general and towards the training centres in particular which could more easily be understood on psychological lines than reversed by psychological treatment. It was therefore impossible to ensure that one's recommendations about occupation would in all cases be carried out: actually they were in more than a third of the cases.

It is difficult to estimate the benefit derived from the various forms of treatment, which were in many cases combined in the one patient. The most satisfactory criterion of improvement seemed the subsequent work-record. It was found on inquiry a year later that just over a third of the men had ceased to be recipients of out-relief, mostly because they had obtained work, and of the others, 5 had had intervals of remunerative work. It must be remembered that the remainder who had not been working included mentally defective, epileptic, insane, elderly, and physically unfit persons. It is of importance also to bear in mind the persistently adverse factors against employment. Many of these men are such as in the London Survey are designated "on the fringe of unemployability" and are held likely to get continuous work only in times of prosperity or expanding trade in their particular line. It was impossible to get from the patients or their wives useful indications of whether or not there had been improvement in symptoms and well-being.

Conclusions

These men are as much social as medical problems. The majority of them are evidently unable to support themselves; the grounds for this are not to be found only in the economic circumstances which are responsible for unemployment in the country as a whole. Their previous history and present state are evidence of inherent deficiencies of adaptation to their environment. In their present circumstances may be seen a continuation of the external factors which for the greater part of their lives have interacted with inherited predispositions to make them in various ways unsatisfactory. It is not from them that one can judge what effect long continued unemployment has on mental health: a series of men previously stable and well adapted must be examined if one would test and amplify the almost universal impression as to the harm it does. The group here dealt with had been selected because of mental deficiency or disorder of some sort which was associated with unemployment, and often indeed its chief cause. Their disability could usually be interpreted along the customary psychological lines, if one assumed a constitutional bias towards neurosis. As far as psychopathology was concerned, there was nothing to distinguish them from other patients, in every class and walk of life, who showed hysterical symptoms, anxiety, and irritability. The group was not quite homogeneous as to clinical picture, but if one excepted the few defective, epileptic, and insane patients, there was a considerable uniformity in it, and a close likeness to the syndrome of the chronic "compensation or pension-neurosis." It would seem that just as in mental hospitals where there was little occupation schizophrenic patients would tend to lose individual

differences and outwardly approximate to a few common types, so persons with hysterical or other types of inadequacy tend, when long unemployed, to exhibit tremors, giddiness, anxiety, hypochondria, resentment, and depression as a fairly characteristic syndrome. They cannot by any means be taken as representative of the unemployed population. Whereas in the latter extraneous factors are mainly responsible for the unemployment, in the group here reported the prevailing economic difficulties seemed only contributory and, in some cases, negligible causes of their lack of work.

Deliberate prophylaxis of such disorders, whether it be genetic or individual, must wait on a better knowledge than we have at present of the essential factors in the causation of neurosis: very likely this end is served to some extent by the now widely available treatment of disorders of behaviour in children, and would be served also by measures of negative eugenics inculcated into, and observed by, psychopathic persons. However this may be, when one is confronted with such patients as these, treatment must be undertaken. It is almost impossible, when seeing these men or studying their individual histories, not to be impressed by the need for early recognition and treatment of their difficulties, before they have become inveterate, and by the need for controlled occupational therapy. Regular occupation with trained supervisors seems the most important requirement for their recovery: if conjoined with psychotherapy it is much more effective, but psychotherapy without regular occupation achieves little. Such a requirement may seem ideal, but it is already available for similar cases at the colony conducted by the Ex-Service Welfare Association, where its value has been proved. The problem of unemployment through neurosis is of course much larger than this, in which one has been considering only men on out-relief; the cost—and the gain—of providing adequate treatment cannot be assessed. But for such men as are here considered, the situation is narrower and simpler. The earlier they are given occupational therapy, with some measure of psychotherapy, the less unfit will they be to cope with their circumstances and the more likely to become socially self-sufficient.

SOME INTERRELATIONS BETWEEN WATER AND FAT METABOLISM IN RELATION TO DISTURBED LIVER FUNCTION

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Since the "fatty liver" is a very important problem both for the clinician and the experimental pathologist working on questions of general metabolism we attempted to find a simple and rapid procedure by which such livers may be obtained in one of our most common laboratory animals, the rat.

A partial hepatectomy, in which 70 per cent. of the liver is removed according to the technique described in a previous paper, initiates compensatory hypertrophy of the remaining lobes but no fatty degeneration. Such animals, even though their general appearance is quite normal, remain in a state of hepatic insufficiency for some time; this was proved by the observation that the detoxication of such anæsthetics as Avertin, which are inactivated by the liver, proceeds at a very slow rate in these animals, while other anæsthetics, like magnesium salts, which are not detoxified by the liver, do not lead to longer anæsthesia after partial hepatectomy than otherwise.[1]

In a recent experimental investigation, designed to study the effect of the liver on diuresis, we availed ourselves of this method for the production of a state of partial hepatic insufficiency. (In all our experiments we used adult male rats weighing approximately 200–250 g.)

I.—In the first group 6 normal rats were slowly injected intravenously with an amount of an isotonic solution of sodium chloride equal to 10 per cent. of the body-weight. Their urine output during the first four hours following the injections averaged 12 c.cm., varying from 10 to 16 c.cm. Laparotomies performed at this time showed that no ascites or visible tissue œdema had formed under the influence of the injections. The urine output at the end of 24 hours following the injections averaged 24 c.cm., varying from 22 to 32 c.cm. At this time the animals were killed; they showed no ascites or œdema; the liver and thymus were of normal appearance.

II.—The second group consisted of 6 rats partially hepatectomised and then injected with the same amount of saline as the animals of Group I. The average urine output during the first four hours was 1·5 c.cm., varying from 0·7 to 2·5 c.cm., and the total output during the 24 hours following injections averaged 10 c.cm., varying from 2·2 to 14·5 c.cm. Laparotomy 4 hours after injection showed marked œdema, particularly of the pancreas and of the retroperitoneal tissue. At autopsy, 24 hours after injection, the tissue œdema was still very marked. The thymus was dark red and very œdematous in all these cases, and showed marked venous hyperæmia and numerous "Mastzellen" in its stroma upon histological examination. The livers of these animals showed marked signs of fatty infiltration, both macro- and microscopically. Frozen sections stained with Sudan III. showed that the fat granules were more or less uniformly spread over the whole lobule and had no focal distribution. The nuclei revealed no signs of degeneration.

III.—The third group consisted of 6 rats partially hepatectomised and injected with saline in the same manner as in Group II. The only difference was that the partial hepatectomy was performed 48 hours previous to the injection. Histological examination shows that 48 hours after partial hepatectomy active mitotic regeneration of the residual liver tissue is already well under way. At this time the ability to excrete water is also regained since these animals eliminated 16 c.cm. (variations from 13·5 to 22 c.cm.) of urine during the first four hours and 35 c.cm. (variations from 28 to 40 c.cm.) during the 24 hours following the injection and showed no œdema or thymus changes at any time during the experiment. Their livers were not fatty.

IV.—In the fourth group we followed the urine excretion of 6 partially hepatectomised and otherwise untreated rats and found that they excreted only 0·4 c.cm. (variations from 0·25 to 0·5 c.cm.) of urine during the first four hours after operation, and 6·2 c.cm. (variations from 4·2 to 10·5 c.cm.) during the 24 hours following hepatectomy. They showed no œdema or ascites at any time and their livers disclosed only very slight degrees of fat deposition after 24 hours. The thymus was normal in all these cases.

V.—In the fifth group, also consisting of 6 rats partially hepatectomised, we removed 5 c.cm. of blood through

[1] Waelsch, H., and Selye, H.: Arch. f. exper. Path. Pharm., 1931, clxi., 115.

Group.	—	Urine output after—		Œdema after—		Ascites after—		Liver after 24 hrs.	Thymus after 24 hrs.
		4 hrs.* c.cm.	24 hrs.* c.cm.	4 hrs.*	24 hrs.*	4 hrs.	24 hrs.		
I.	Saline.	12 (10–16)	24 (22–32)	—	—	—	—	Normal.	Normal.
II.	Saline + hepatectomy. (Injection at time of operation.)	1·5 (0·7–2·5)	10 (2·2–14)	+	+	Trace.	Trace.	Fatty.	Œdema and hæmorrhages.
III.	Saline + hepatectomy. (Injection 48 hrs. after operation.)	16 (13·5–22)	35 (28–40)	—	—	—	—	Normal.	Normal.
IV.	Partial hepatectomy.	0·4 (0·25–0·5)	6·2 (4·2–10·5)	—	—	—	—	Normal.†	,,
V.	Partial hepatectomy + bleeding.	0·5 (0·0–0·7)	10·2 (11·8–13·0)	—	—	—	—	Fatty.	,,
VI.	Nephrectomy.	—	—	—	—	+	+	Normal.	Slight œdema.
VII.	Hypophysectomy+ partial hepatectomy.	Not examined.	Not examined.	—	—	—	—	,,	Normal.
VIII.	Adrenalectomy + partial hepatectomy.	,,	,,	—	—	—	—	,,	,,

* The figures given are averages from the whole group. The numbers in parentheses represent the greatest variations observed.
† Or trace of fat deposition.

an injection needle inserted into the heart through the left jugular vein. The average urine excretion after 4 hours was 0·5 c.cm. (variations from 0 to 0·7 c.cm.) and after 24 hours 10·2 c.cm. (variations from 11·8 to 13·0 c.cm.). They never showed œdema nor ascites nor any thymus changes. Their liver was always markedly fatty. Six controls to this group showed that the removal of the same amount of blood does not produce fatty changes in the livers of normal rats with intact livers.

VI.—In order to see whether the tissue œdema and the thymus changes observed in Group II. were simply a result of the inability of such animals to excrete water, we performed bilateral nephrectomies on 6 rats and injected them with the same amount of saline as the animals of Group II. received. Four hours after injection they all showed much ascites but no trace of visible tissue œdema. Before the 24 hours were over, 3 of them died with severe ascites and such large quantities of pleural water accumulation that death was caused by lung atelectasis. The remaining 3 were sacrificed and also showed marked peritoneal and pleural water accumulations, but no pancreas œdema, and only slight thymus œdema. It seems obvious therefore that the tissue œdema observed after partial hepatectomy is not simply the result of defective water elimination.

We see that after partial hepatectomy the liver remnant shows marked fatty changes if the animals are bled or injected with large quantities of saline. In another series of 6 rats we were able to establish that the liver remnants show conspicuous fatty changes if the drinking-water be withdrawn from the animals after the operation. It appears therefore that any interference with water metabolism exerts a great strain on the relatively small liver remnant and causes fatty changes.

Since the removal of the hypophysis inhibits the fat deposition which is otherwise observed after pancreatectomy in the dog, we were interested to see whether it would also prevent the production of fatty livers under the conditions of the above experiments.

VII.—Seven rats, hypophysectomised months before the present experiments, were partially hepatectomised, and water was then withheld from them. They were killed 24 hours after hepatectomy, at which time only one of the seven showed a fatty liver and this one proved to be a partial hypophysectomy, in which the remaining piece of pituitary tissue sufficed to prevent adrenal and testicular atrophy.

This experiment suggests that the pituitary is essential for the deposition of fat in the liver. We wish to mention, in this connexion, that in 8 other rats, partially hepatectomised and hypophysectomised in one session, fatty degeneration of the liver remnants was not prevented. We deemed it possible that the inhibition of the fatty changes would not be observed until the adrenal atrophy developed.

VIII.—Six rats hepatectomised and deprived of water 24 hours after adrenalectomy seemed to confirm this view, since none of them showed fatty liver changes.

We feel that many more experiments will have to be done in order to clarify these strange interrelations between water and fat metabolism and the influence of the liver and of pituitary and adrenal hormones on them. In the present communication we merely wish to point out that such interrelations do exist. Experiments now under way in this laboratory are particularly designed to study the chemical aspects of this problem. The accompanying Table summarises our results.

COLOSTOMY AND ITS INHERENT DIFFICULTIES

A SUGGESTED OPERATIVE TECHNIQUE

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ALTHOUGH the technique of colostomy has passed through three distinct phases, the ordinary procedure adopted in the operation to-day differs in no way from that followed by Duret [1] in 1793 in the first recorded successful case of sigmoid colostomy. Great interest was taken in this procedure, and in France it became known as the method of Littre,[2] who, as far as records carry us, was the first to suggest (1710) that this method of dealing with certain cases of imperforate anus might be possible in the future. As far as we know Littre made no attempt himself to carry out this suggestion.

The first deliberate formation of an artificial anus of which we have record, was made by Pillore [3] of Rouen in 1776, who, however, "chose the cæcum as that part of the intestine which was most fitting to fulfil my object, both by its situation, and because it would act as a reser-

voir and we should thus avoid a continuous and involuntary discharge of excrements."

Callisen [4] of Copenhagen and Duret of Brest, investigated in the post-mortem room the possibilities of a lumbar colostomy, but each found that he had opened the peritoneum in performing the operation, and accordingly rejected this route. Duret's observation on lumbar colostomy took place in 1793; the date of Callisen's observation is not definitely known, but it is believed to be prior to that of Duret.

The situation as regards colostomy in 1797 is fortunately very clearly outlined for us by discussions [5] aroused in the Sociétés de Santé of Paris and Lyon following a timely paper by Dumas [6] of Montpellier, Observations and Reflections on Imperforate Anus.

In the first phase of colostomy, which lasted nearly fifty years after Duret's successful operation, Littre's method was used, and during that time the procedure was applied to a limited number of cases. The results in these cases were so unsatisfactory on the whole, the danger of interfering with the peritoneal cavity being as yet unsurmounted, that Amussat in 1838 dared not employ this remedy in the case of Prof. Broussais, who died of carcinoma of the rectum. Subsequent reflection on the subject impelled Amussat [7] to reinvestigate the possibility of lumbar colostomy. He found that it was possible to carry out this operation without opening the peritoneal cavity, especially when the bowel was distended as in obstruction, or was artificially blown up. He developed the technique and produced such good results as far as immediate mortality was concerned, that his operation came into general use and remained so during the greater part of the 19th century. With the introduction of asepsis and anæsthesia in surgery, a return was gradually made to the abdominal route now employed.

During the first phase a mesocolic stitch was not infrequently used, so that a satisfactory spur often resulted, although the importance of the stitch with relation to the spur had not been fully appreciated. A mesenteric stitch was the recognised procedure in cases of gangrenous hernia, being inserted to prevent the opened bowel from slipping back into the peritoneal cavity. Indeed, the spur most useful in colostomy proved most refractory in preventing the closure of the "anus contre-nature" developing from this delayed treatment of hernia. The problem of its treatment was finally solved by Dupuytren [8] in 1816, when he introduced his spur crusher, which still forms part of the equipment of every theatre and is used in the restoration of continuity of the colon after a temporary colostomy, or after a Paul's operation. In the second phase, with the lumbar colostomy, it was only possible to attach the bowel wall to the lips of the wound, so that a satisfactory spur was not obtained. Thus, in the third phase, with the return to the abdominal route, the importance of the mesocolic stitch was not definitely established, so that an unsatisfactory spur was a very frequent complication until Allingham Junr.[9] reintroduced the stitch as an essential step in the procedure.

One outstanding lesson to be learned from a review of the literature of the subject is the great inherent antipathy to this remedy. This is perhaps largely attributable to the miseries of the uncontrollable and inaccessible lumbar colostomy and to the prejudice handed down from that time.

As we have noted, the present-day operation is fundamentally the same as in 1793, and yet, by care in the performance, in the after-treatment, and in the training of the patient in the management of the colostomy, surgery has made tremendous progress in overcoming its disadvantages. So much so that a surgeon performing large numbers of colostomies may feel some surprise when he finds a patient whose prejudices persist after full explanation.

And yet the results are not so invariably good that they can be expected to overcome this prejudice entirely. Occasionally a patient is so comfortable with a colostomy that he is not prepared to submit to the small risk of closure even if advised to have this done. Frequently [2] a patient is so thankful to have escaped previous miseries that he rests content with a colostomy when he understands there is no escape from it. It may be assumed that in such cases the colostomy is well-behaved, that it requires little attention, and that the patient is so placed that what attention it does require is well within his power to give.

A considerable number of patients with colostomy, however, are far from content. These may be divided into two classes: (1) Those who are so placed that a colostomy life is possible if the colostomy is satisfactory. (2) Those who are so placed that the necessity for colostomy is almost inevitably a tragedy.

In the first group much may be done to relieve discontent by a suitable refurbishing of an unsatisfactory colostomy. The second group consists for the most part of men engaged in manual labour. In women doing housework it is generally possible whatever their status to arrange matters, but to a manual worker living in a congested area and working under the crude sanitary arrangements provided for some workmen during work hours, the prospect is unfaceable.

Inasmuch as the surgery of one generation may have found inexpedient a procedure quite practicable in the next, it is periodically necessary to review two questions, firstly, how the number of cases left with colostomy may be diminished, and secondly, how the technique and after-treatment may be improved to give a lower percentage of cripples and malcontents.

With regard to the first of these, many of these colostomies have been performed for cancer, some inoperable, others operable but involving the lower third of the pelvic colon down to the anus. Can any form of operation which will avoid colostomy be introduced with comparative safety with more careful selection in cases of low sigmoid or high rectal carcinoma? This question must exercise the minds of many who have reached the stage where the power to perform the accepted operations smoothly and confidently need no longer be regarded as the height of achievement. This matter is, however, outside the scope of this paper, the object of which is to deal with the second question.

It is proposed to consider here the best site for an artificial anus, the commonest ways in which such an anus becomes unsatisfactory, and to suggest a technique by which unnecessary defects may be avoided as far as possible.

THE SITE

A colostomy may be either terminal or subterminal. The terminal variety seldom has complications if reasonable care is taken in its construction, but the subterminal or loop colostomy is not infrequently far from satisfactory. For this reason some surgeons have tried the device of dividing the bowel, closing the distal end and dropping it back into the abdomen, so as to be able to use the proximal end as a terminal colostomy. This has the disadvantage of burying in the abdomen a partially obstructed and therefore probably infected loop of bowel. It is certain that the difficulties of the subterminal colostomy cannot be solved thus. If the bowel is divided the distal portion should most certainly be accessible for any washing out that may be necessary.

As noted above, the lumbar route was chosen in pre-antiseptic days because it gave access to the ascending and descending colon—usually the latter—which have no mesentery and could therefore be opened without peritoneal soiling, especially when

the bowel was distended. Nowadays this site has nothing to recommend it. The operation is comparatively difficult to perform, a spur cannot be reckoned on, and the inaccessibility of the stoma for washouts and cleansing makes it intolerable from the patient's point of view.

As to general site then everyone is now agreed that if there is no possibility of retaining a controllable anus in the natural position, it is necessary to fashion an artificial, reasonably controllable one in an accessible situation. An abdominal colostomy is the only one that fulfils these conditions.

There is still some lack of unanimity as to the most suitable position for the sigmoid colostomy. The direct routes for the cæcum and the sigmoid lie through the right and left iliac fossæ. For the transverse colon the choice commonly falls on a muscle-splitting incision through the rectus. Indeed, so satisfactory has control by the rectus proved that this route has seemed to many surgeons in this country to be preferable even in the case of sigmoid colostomy. Recently, however, it has become more usual to adopt the obvious approach in each case.

The following reasons favour the inguinal route for sigmoid colostomy.

The opening is nearer the flank. It is therefore easier to close off completely the peritoneal space lateral to it and thus prevent all possibility of internal hernia here. It is further from any future mid-line incision. It is nearer the pelvis, so that if a purely perineal excision is performed subsequently there is less possibility of drag on the pelvic colon, and if the combined perineal and abdominal operation is performed, the bowel below the colostomy and the gap in the peritoneum can be more easily dealt with. Apart from these secondary considerations the layers of the abdominal wall in the left iliac fossa afford practical advantages for the actual colostomy.

In the muscle-splitting operation through the left iliac fossa the following demonstration of its advantage may be made during operation. A split is made through the aponeurosis of the external oblique and another is made in the deep muscles with its centre opposite the centre of the split in the external oblique. If the patient is now made or allowed to strain during the anæsthetic the hole in the deeper layer tends to be drawn laterally and sometimes quite clear of the split in the external oblique.

During strain, then, it may be argued that in an inguinal colostomy the gut traversing the muscle-splitting incision tends to be distorted as well as compressed, and an additional supporting factor is provided. The extent of this distortion varies with the distance externally from the rectus sheath.

In the incision through the rectus the hole through the abdominal parietes is compressed during coughing or straining but remains undistorted. This variety relies on muscular contraction, which in a carefully planned incision usually gives adequate control during straining.

FAULTY RESULTS

The method in which the colostomy is performed is of the greatest importance. There is no doubt that the simplest colostomy—an incision through the parietes just adequate for the loop to lie comfortably in each layer, with the loop held in position with a glass rod, and the bowel wall and skin so trimmed that the double-barrelled effect is not hooded by bowel wall or by skin—gives satisfactory results in the majority of cases, particularly if the operation area is properly supported after operation and no post-operative distension allowed to throw strain on this weakened part. In a recent paper Gabriel and Lloyd-Davies [10] survey the end-results of colostomy cases at St. Mark's Hospital and find that in 86 per cent. the function is satisfactory. These results are interesting inasmuch as the operations in this series have been performed by experts who have devoted considerable thought to the shortcomings of colostomies, and it may be assumed that the figures present a correspondingly favourable view of the end-results. A review of the results of colostomies throughout the country would probably be far more discouraging.

The following faults are the most common :—

1. *Retraction of spur.*—An essential of the satisfactory subterminal colostomy is the provision of a suitable mechanism for preventing fæces from entering the unused portion of the bowel. This mechanism may be furnished by the projection (spur) of the posterior wall of an incompletely divided bowel, or by some interposition of abdominal wall in a completely divided bowel. If the tissue intervening between the proximal and the distal stoma sinks below the surface of the skin, the mechanism fails, fæces pass into the distal stoma and further disability results from infection here, and possibly from fistula formation. In such cases the spur must be advanced, which may be a simple matter or may require an extensive repair of hernia.

2. *Stenosis.*—The tendency in a muscular aperture is to enlarge, especially under strain, but that of a skin opening is to contract, and stenosis of the skin in relation to colostomy is not uncommon. With stricture formation in the skin it may happen that the gut remains pouting, becomes œdematous and is obstructed in this way. More often as the skin contracts the bowel tends to recede into the subcutaneous layers. As the portion of bowel attached to the deep fascia remains more or less in situ, the intermediate portion pouches into the subcutaneous area, but such a pouch is of no disadvantage unless it is associated with skin stenosis.

In its worst form this stenosis with subcutaneous bulge may be regarded as a complication associated with simple rod colostomies that have been performed through inches of subcutaneous fat. The permanent spur is then only supported by a fibrous cord of scar tissue in the subcutaneous layer connected with the skin on both sides of the colostomy and passing through the mesentery where the rod lay. This support is somewhat inadequate in stout subjects, especially when the skin is tending to stenose around the stoma. The difficulty arises infrequently in thinner subjects, because the more closely the fibrous cord is related to the fascial external oblique the more stable the supporting mechanism.

This condition frequently calls for operation to remove the hood of skin, to enlarge the opening of the bowel and to stabilise the fibrous cord in relation to the deep fascia. The skin may be stitched to the deep fascia to prevent pouching. Owing to instability it is not infrequently associated with hernia and further treatment is necessitated for this.

3. *Hernia.*—In hernia during coughing and straining gut is flung en masse against a weakened portion of the fibromuscular wall which tends to give before it. The resulting bulge may be a small hemispherical one—when a little more of a loosely fixed colonic loop momentarily pushes through and recedes—or may be associated with a progressively enlarging pear-shaped hernial sac, similar to that in an ordinary incisional hernia.

4. *Prolapse.*—The causative factors in prolapse are accessory to those of hernia. In hernia the gut is flung en masse at the weak area during straining and coughing, but for a prolapse to result from such a strain it must happen that the colon adjoining the proximal or distal orifice is projected or forced end-on at a lax stoma, through which it protrudes. This obviously can happen most easily when the distortive action of the deep muscular layers is absent as in a "through the rectus" incision, or where the hole has been so constructed that the fibromuscular walls are very loosely apposed to the colostomy loop. This poor apposition of the fibromuscular layers means, therefore, that a potential hernia is present. In addition, the bowel prolapsed must be part of a loose loop or it could not prolapse. It is advisable, therefore, in performing the operation to draw down fairly tightly the upper loop which most often prolapses,

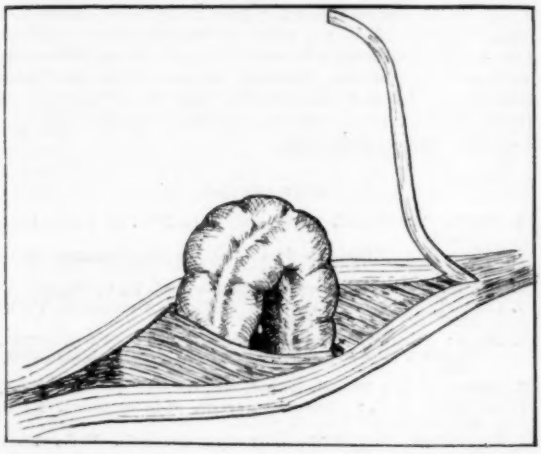

FIG. 1.—The deep muscles are supported with a silk suture.

but this not infrequently leaves the lower one lax. Indeed, in performing a colostomy with a view to subsequent radical procedures it is advantageous to leave the lower one as free as possible. To compensate for this laxity the abdominal wall may be left surrounding the bowel more firmly in the lower compartment.

Hernia, and also prolapse, are therefore best prevented by making the aperture in the abdominal parietes suitable in size from the beginning and preventing its enlargement. The hole should never take more than two fingers. It is unwise to attempt to enlarge for exploratory purposes the incision through which the bowel is to be brought for loop colostomy, in the belief that the hole can be satisfactorily reduced to the required size by careful resuture. Not only must the hole in the deep muscular layer not be made greater than is required for the actual colostomy, but also all possible measures must be taken to prevent it from stretching postoperatively.

The stress of a cough on a wound stitched up throughout its whole length is very small compared with that resulting when it is incompletely stitched so as to fit loosely around a loop of bowel. This loop becomes transformed in the act of straining into a wedge tending to increase the hole. Also favouring this increase a mild inflammatory process is likely to occur immediately after operation, sufficient to weaken the grip of the stitch partially closing such a wound, or to favour cutting-out. All precautions to ensure the resistance to herniation should be taken at the outset. If this resistance is adequate from the beginning all will remain well. If inadequate precautions are taken, the hole in the fibromuscular layer will undergo increase after operation, and at

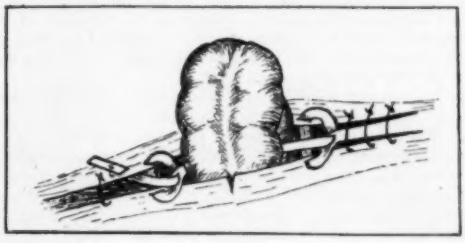

FIG. 2.—Method of suture of aponeurosis of external oblique.

the end of convalescence there will be present an appreciable bulge which will tend to increase slowly with further activity. It must be remembered that all the surgeon has to do to increase the size of the opening obtained by muscle-splitting is to stretch further, and this stretching process is comparable to that which occurs under the force of coughing or straining.

SUGGESTED TECHNIQUE

The following technique is the one I have developed for use as a routine, after survey of the various possible methods. It aims at preserving the spur, preventing hernia, and diminishing the risk of prolapse.

A circular incision, diameter 1¼ in., is made by pulling up and shearing off the skin around a point 2 in. internal to and just above the anterior superior spine. This disc of skin and the underlying fat are removed and the aponeuroses of the external oblique exposed. The skin incision is enlarged up and down. A fascial strip just over ¼ in. wide and 3½ in. long is then split off the external oblique. Externally, the strip is carried back parallel to the fibres as far as the muscle insertion, medially almost to the middle line (Fig. 1). Here it will be seen to consist of

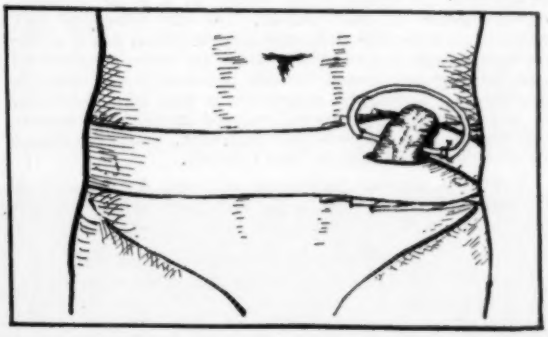

FIG. 3.—Strips of vaseline gauze surrounding colostomy are fixed by elastoplast strips carried round to back. The glass rod is stitched to the elastoplast. A second layer of vaseline gauze is now placed round the loop of bowel before this is opened transversely.

only one layer of the anterior rectal sheath. It is freed at its medial extremity. Retraction of skin is, of course, necessary in this procedure.

About the middle of the circular incision the deeper layers of the abdominal wall are then split for not more than 2 in. An incision admitting two fingers easily is made in the peritoneum.

The iliac or pelvic colon is sought and with due regard to the required tightness of the proximal loop a piece of tape

is passed through the mesentery close to the bowel at a point suitable for colostomy. If the loop will not come up into the wound satisfactorily, the outer mesenteric fold and any adhesions reinforcing it are dissected up until there is no drag on the colon as it lies in the position required for colostomy.

The loop is returned to the abdominal cavity while further intra-abdominal examination is made. If considered advisable, a running suture is inserted to obliterate the peritoneal space outside the colostomy in which small gut might become trapped.

The colostomy loop is now withdrawn and the divided peritoneum approximated through the hole in the mesentery. The limits of the split in the deepest muscular layers are fixed with a No. 2 silk suture to prevent stretching here (Fig. 1). A Galley's needle is now applied to the fascial strip. It is carried through the edge of the divided external oblique at the selected point and locked, then through the mesentery, fixing the external oblique together on the inner side, locked and fixed there with silk (Fig. 2). Anterior and posterior to this locking suture the external oblique is sutured with catgut. Particular care is taken at the external angle of the rectus sheath. If either the upper or lower compartment of the hole through the external oblique appears tight, the lips may be notched until the desired size is reached. The lower compartment may be left tighter than the upper.

A rod is placed through the mesenteric hole superficial to the fascial strip, and the ends fixed by a complete loop of rubber tubing. In a very fat patient the rod and fascial strip should not both go through the same point in the mesentery unless the subcutaneous fat is excised over a wide surrounding area. In a fat patient the fat is stitched to the deep fascia to prevent the bowel bulging into the subcutaneous plane. The skin is then approximated round the bowel.

Two strips of vaseline or paraffin and flavine gauze are placed around the colostomy loop crossing under the rod on each side. If thought necessary, these are stitched to the skin at one or two points. The gauze is fixed in place by strips of elastoplast surrounding the wound, and these are carried round to the back as far as the lateral border of the erector spinæ on both sides to further support the weakened area. The glass rod is sutured to the surface of the elastoplast to prevent movement. The bowel is next covered with a layer of vaseline lint, a small hole is cut in this, and the bowel is opened transversely with a cautery. Any gross mass of fæces is removed. The stoma is covered with vaseline gauze. Delay in opening the stoma often results in a great measure of discomfort to the patient. On the following and subsequent days, the dressings may be taken down as far as the elastoplast, and at any time an ounce or more of paraffin may be injected into the proximal stoma through a catheter. Later, the colostomy is well trimmed back, as any redundant peritoneal covered bowel left exposed will recede into the subcutaneous area, tending to drag back the spur and also to form a pouch.

NOTE.—A similar technique is used for colostomy through the rectus sheath, the anterior sheath of which affords an excellent strip.

Repair of unsatisfactory colostomy.—In repair of a colostomy for hernia or retracted spur the fascial graft is also used.

The colostomy loop is freed from the skin and the layers of the abdominal wall are defined and freed from each other and from the peritoneum, which is not opened. The colostomy loop is now pulled forward together with the peritoneum, and cholecystectomy forceps are worked round the bowel. This can usually be done without opening the peritoneum. Through the hole a supporting fascial strip and a temporarily reinforcing rubber tube are to be passed. A fascial strip is taken from the external oblique on one or other side of the colostomy, if this seems suitable. If the hernia is large, the musculature weak, the external oblique will probably be unsuitable for a graft, and a long strip from the thigh is taken. The deep muscular layers of the abdominal wall are sutured closely round the loop. The fascial strip from the external oblique or from the thigh is then used to suture the external oblique and to reinforce the spur, as in the operation described above. The remaining procedure is as already outlined. If there is a bad degree of prolapse, it may be necessary to amputate this subsequently.

In developing this technique I used the fascial strip method first with the route through the rectus. I found it always adequate as regards spur maintenance, but occasionally slight hernial bulging developed, because the hole in the posterior rectus sheath tends to get bigger, and in one or two of these cases there was a slight tendency to prolapse. The use of the inguinal route combined with a stitch support of the deep layers is, however, most satisfactory.

The anatomy of this region lends itself readily to this method of dealing with the special mechanical difficulties that are inseparable from the establishment of a satisfactory abdominal anus. The fascial strip cross-ties and firmly supports the fibromuscular aperture in the diameter which is usually the widest and weakest, and no other form of suture affords the same measure of security. I have therefore ventured to put the method on record in the hope that some of the suggestions may be of service to those who have not yet standardised their technique to their own satisfaction.

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Clinical and Laboratory Notes

BILATERAL ZOSTER AND ZOSTER VARICELLOSUS

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THE apparent rarity of bilateral zoster makes this case worthy of record.

A man, aged 21, a packer of wireless cabinets, attended the London Hospital with a typical zoster eruption of the right shoulder, left loin, and abdomen. Five days previously he had noticed irritation of his left buttock and loin. Shortly afterwards he noticed the eruption in this situation. The next day he noticed irritation of his right shoulder and a similar eruption appeared. At the same time scattered spots appeared over his trunk. He gave no history of previous illness and he had never had chicken-pox or zoster.

When he was first seen five days from the onset of the eruption, there were groups of vesicles and bullæ containing slightly turbid fluid grouped on an inflamed base in the areas of distribution of the right third, fourth, and fifth cervical nerve-roots and the left dorsal tenth, eleventh, twelfth and first and second lumbar nerve-roots as shown in the accompanying illustration. In addition he had a sparse eruption of scattered discrete pinhead vesicles on erythematous macules distributed on the back, chest, abdomen

Photographs showing the site of the zoster lesions.

and buttocks. All the vesicles were in the same phase of evolution and differed in this respect from the lesions of varicella. The right axillary and the left inguinal lymphatic glands were enlarged.

The patient's temperature was 100° F. and the pulse-rate 88. Physical examination revealed no abnormalities. The patient felt well and complained of no subjective symptoms except slight burning and irritation. He was treated in bed and given sodium iodide grs. 10 t.d.s. by the mouth. A dusting powder was applied to the vesicles. The vesicles rapidly dried up and he developed no post-herpetic pain.

Serum collected fourteen days after the onset of the eruption gave a positive complement-fixation reaction with a vesicular antigen from another case of zoster.

My thanks are due to Dr. W. J. O'Donovan for permission to publish this case and to Dr. R. T. Brain for the information about the complement-fixation reaction.

DYSOSTOSIS CLEIDOCRANIALIS SHOWING UNIQUE SCAPULÆ OF PRIMITIVE TYPE *

By Victor J. Kinsella, F.R.C.S. Eng.

Dysostosis cleidocranialis is a developmental deficiency of the skeleton affecting chiefly the clavicles and the bones of the cranial vault. It is complementary to achondroplasia, in which the cartilage bones bear the brunt of the disorder.

Its interest lies firstly in its rarity. Although it was described as long ago as 1766, a careful review of the literature in 1908 by Hultkrantz revealed only 31 cases described clinically. There are a few other cases in which reference is made to either the clavicle or the skull alone. In the museums of the world there are only nine skulls showing the condition, five of these being in the institute of pathological anatomy of the University of Vienna. This institute contains also the skeletons of two cases—I believe the only two in existence. Efforts have been made by other institutions to obtain some of this material, but even in their days of tribulation, the Viennese preserve their sense of relative values and their museums retain their treasures.

The second source of interest is the light which this condition is said to throw upon the development of the clavicle, the first bone in the human body to ossify. In the embryonic clavicle, cartilage cells and afterwards osseous tissue make their appearance in a peculiar precartilaginous condensation of the mesenchyme. Seeing that in cleidocranial dysostosis the clavicle suffers along with the bones of the cranial vault, the clavicle itself has been looked upon as being partly a membrane bone. But as we shall see in the case which I am presenting, interference with growth in cleidocranial dysostosis may be found also in bones developed in cartilage—e.g., the scapulæ and phalanges of the foot.

A third point of interest is that the possible development of the clavicle in two parts complicates the attempt of morphologists to recognise in the human shoulder girdle the two ventral elements of the primitive pectoral girdle, the coracoid and pre-coracoid, which are seen in some of the lower animals, and which correspond with the pubis and ischium of the pelvic girdle. In the fruitless controversies over this question almost every possible combination has been made to represent the primitive elements from among the centres of ossification of the coracoid process, the clavicles, the metacromion, the supra-sternal bones, and the various ligaments around the clavicle (costoclavicular, coracoclavicular and costo-coracoid and the articular disc). Some morphologists

FIG. 1.—Radiogram of chest showing abnormality of clavicles.

* Communicated to the Royal Prince Alfred Hospital Medical Officers' Association, Sydney.

deny that the shoulder girdle has any pubic representative.

The patient who came under my care is a boy of 16 years. He is of slender build and with more than average intelligence, features noted by Paltauf in his case. His parents relate that the anterior fontanelle closed very late. In many cases a strong hereditary tendency has been noted, but clinical examination of the parents of this boy and X ray examination of their hands revealed no abnormality, and no relevant point could be elicited in the family history. A large number of the cases described are of French extraction, as was pointed out to me by Dr. Sear, but the parents of my patient knew of no French blood in their families.

The patient was almost able to approximate his shoulders across the front of his chest. On palpation absence of the acromial end of each clavicle was noted. The sternal ends tapered laterally to a point. These bones can be seen in the radiogram in the upper part of the lung field, and their radiographic density is much less than that of the ribs. They are no doubt very soft and deficient in lime salts (Fig. 1). From the under surface of the pointed extremities a thin cord passed laterally to the shoulder regions. Whether these cords were attached laterally to the coracoid or acromion or to some other part could not be definitely determined, but they probably represent the coracoclavicular ligaments (or thickened upper edge of the costocoracoid membrane). The clavicular parts of the deltoid and pectoralis major muscles were poorly, if at all, developed. The patient complained of no disability associated with the condition of his shoulder girdle; on the contrary, he played such games as tennis with ease. Absence of the acromial end of each clavicle, as described above, is the commonest type of clavicular abnormality met with in these cases. The next most common arrangement is replacement of the middle portion by a fibrous band which unites the acromial and sternal extremities.

Fig. 2 shows an apparent absence of the supraspinous fossæ of the scapulæ, the spine and acromion springing directly from the upper border, an arrangement rather similar to that found in the iguana and platypus. I cannot find reference to such a malformation in any other case. I am indebted to the director of the pathological anatomical institute of the University of Vienna for a personal communication, wherein he informs me that there is no such abnormality in the scapulæ of the two skeletons in the institute.

The skull in this patient shows the features usually described—a large cranial vault, small and narrow base, small facial bones, metopic suture, wormian bones in the neighbourhood of the lambda, high vaulting of the palate, and marked delay and irregularity in the eruption of the teeth. The erupted teeth were stunted and all were milk teeth, except three premolars and one canine. The remaining second teeth were still unerupted. The dental surgeon is at present exercised to provide an efficient masticatory apparatus, and proposes the removal of the erupted teeth and the use of prostheses. Dr. Sear has drawn my attention to an increased density along the suture lines in these radiograms, a feature already noted in cases seen by him.

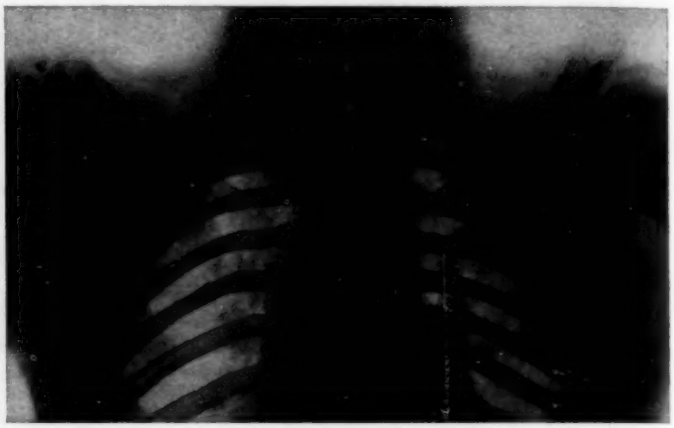


FIG. 2.—Radiogram showing abnormality of scapulæ.

Radiograms of the toes are illustrated in Fig. 3 together with those of a normal person of about the same size but three years older than the patient. Note the shortening of the phalanges (already described by Murk Jansen) and the more open texture of the cancellous bone and deficient development of the compact bone. The phalanges of the hand show similar features in lesser degree. The index metacarpal is very long and shows an epiphysis at each end.

There were also noted a marked scoliosis, with lower limbs of equal length, bilateral cervical rib, club-feet corrected by operation in infancy, and changes in the pelvis. The narrowing of the pelvis, especially of the ilium, and the gap in the region of the symphysis pubis have already been noted, as by Paltauf.

For further accounts of cleidocranial dysostosis, and of the various speculative questions associated therewith, the reader may consult articles by Fitzwilliams [1] and Paltauf.[2]

FIG. 3.—Radiogram of the patient's toes (left-hand photograph) compared with those of a normal person.

PEPTIC ULCER IN A SOLOMON ISLAND NATIVE

By Clifford James, M.B. N.Z., F.R.C.S. Edin., D.T.M. & H.

It has been said that peptic ulcers are "confined to men of civilised races living in temperate climates,"[1] and the following case may therefore be of interest.

I had started medical work in a native-built hospital on Choiseul, the island lying at the north-western extremity of the British Solomons Group, and the most out-of-the-way of the larger islands. The latitude is 7° South, and the climate hot and moist. Organised fighting had ceased about ten years before. The wildest part of

[1] Fitzwilliams, D. C. L.: THE LANCET, 1910, ii., 1466.
[2] Paltauf, R.: Verhandl. d. Deut. path. Gesells., 1912, xv., 337.
[3] Ogilvie, W. H.: THE LANCET, 1935. i., 419.

the island was on the Vurulata River, and from this region came my patient.

Qoqoro, a male native aged approximately 27 years, small in build, sturdy, but undernourished, was brought by his relatives because they said that he would die if left in his village. He was becoming thin. He himself said that he had pain in his abdomen, and "while his mouth wanted to eat his stomach would not let it eat." When he ate, it caused pain, and so he did not eat. Eating was followed by vomiting which gave relief.

On examination, he was obviously thin. He put one finger on a spot in the epigastrium to the left of the midline, and pressure there caused pain. It was quite localised. His spleen was enlarged to a point half way between the costal margin and the umbilicus, being due to malaria which is universal throughout the island. He also suffered from yaws as evidenced by the worm-eaten appearance of the soles of his feet; yaws also is universal. His mouth was red from the betel-nut which he was chewing, and his gums showed evidence of pyorrhœa which also is very common.

As malaria is the cause of most epigastric trouble in these parts, he was admitted to hospital and treated with quinine, and iron tonics. He received weekly injections of neoarsphenamine for his yaws. But while his malaria was much improved, and his yaws was cured, he still complained of his pain. A diagnosis of peptic ulcer was made. A mixture containing bismuth and sod. bicarb. relieved his pain, but considering the patient and his food and mode of life, a cure from medical treatment was not to be expected. The place we called the "theatre," and the staff consisting of one white nurse and one orderly, newly arrived from the bush, made surgical treatment also rather an unknown quantity.

Under rectal ether with some chloroform on a mask as required, a laparotomy was done, and on the anterior wall of the stomach very near the lesser curvature, and about 2 inches from the pylorous, an ulcer was found and demonstrated to the nurse. It was round, with a definite edge moderately hard, and the crater admitted the tip of my little finger. Some adhesions stretched from the peritoneal surface of the base of the ulcer to the liver. A posterior gastro-jejunostomy was done and the incision closed. He passed tarry stools for three days, but thereafter his recovery was uneventful and rapid. He was put on to alkalis. He gained rapidly in weight, so much so that his scar was stretched to an inch in width. When I saw him two years later he had put on 2 stones in weight, had no pain, and was thoroughly satisfied with himself. He had not needed to work because the story of "how we did it" would always secure him a meal.

While this complaint cannot be common, its frequency is difficult to estimate. These people are used to disease, and consider such things as fever and yaws as part of their normal lives. It was only the severity of the symptoms of the above case which made him come for treatment. Those with less discomfort would not come. Anæsthetics and operations were a very new thing and to be avoided if possible.

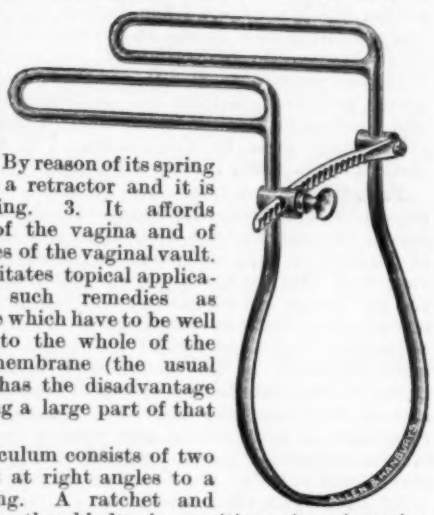
Amongst these people, furthermore, there are factors which would predispose to peptic ulceration. Malaria causes anæmia and a generally lessened resistance to disease. Ulcers occur in other sites, particularly the skin, with the greatest of ease. Their food is coarse, mostly vegetable, and consists of taro, yam, sweet potato, banana, tapioca, and—in times of stress when the gardens are poor—coconut, which is poorly chewed, and is swallowed in lumps. All their foods are insufficiently masticated. Chewing is a waste of time. Their meals are often huge, and are taken at more or less irregular intervals. The diet is unbalanced, and except for a little fish is of necessity vegetarian. Pyorrhœa as has been stated is very common, the gums exuding pus, and the teeth becoming prematurely loosened, and dropping out. Malaria, while lessening the resistance of the patient, also damages the lining of the stomach. The subtertian parasite, by sporulating in the gastric vessels, causes congestion, thrombosis, and subsequently bleeding into the stomach.

On the other hand, the malaria which does the damage to the blood and to the stomach also lowers the gastric acidity, as many as 26 per cent. of patients having achlorhydria. While pyorrhœa is so common, caries and apical abscesses are rare, and correspondingly, bacteria in the blood from that source are rare also. Nasal sinus involvement is not uncommon, but septic tonsils are not common. Betel nut is also a factor. This nut is most unpalatable if taken alone, but when combined with lime it loses its acridity, turns red, and becomes palatable. The amount of lime that is used is considerable, and while a good deal is ejected, as with tobacco-chewing, a fair amount must be swallowed. These folks are not heavy smokers, as the white man considers smoking, but they are much subject to cold and damp. Few have blankets, and most spend the night lying alongside a small fire, which is renewed when the chilliness has awakened the sleeper.

NEW INVENTIONS

SELF-RETAINING VAGINAL SPECULUM FOR TOPICAL APPLICATIONS

THIS speculum which is in use at the Tuckingmill Venereal Diseases Clinic serves the following purposes: 1. It is readily introduced into any sized vaginal orifice. 2. By reason of its spring it acts as a retractor and it is self-retaining. 3. It affords full view of the vagina and of the fornices of the vaginal vault. 4. It facilitates topical application of such remedies as urochrome which have to be well rubbed into the whole of the mucous membrane (the usual speculum has the disadvantage of covering a large part of that surface).



The speculum consists of two blades set at right angles to a bow spring. A ratchet and screw fixes the blades in position after insertion. The blades are four inches long and three-quarters of an inch wide, but fenestrated.

The instrument has been made for me by Messrs. Allen and Hanburys, Ltd., Bethnal Green, E.2.

C. H. RIVERS, M.D., M.R.C.P. Lond.

NEW WESTMINSTER HOSPITAL.—As a precaution against flooding the new medical school and nurses' home at this hospital are to be built on a typical old Thames site. The basement will be a great watertight concrete-asphalt tank nearly 100 yards long, 30 yards wide, and 5 to 7 yards deep. Nearly 200 concrete blocks placed over the floor of the tank will support main stanchions on which the building will rise to a height of over 100 feet from the basement level to the motor-house on the flat roof.

REVIEWS AND NOTICES OF BOOKS

Epidemics and Crowd Diseases

An Introduction to the Study of Epidemiology. By MAJOR GREENWOOD, D.Sc., F.R.C.P., F.R.S., President of the Royal Statistical Society; Professor of Epidemiology and Vital Statistics in the University of London and London School of Hygiene and Tropical Medicine. London: Williams and Norgate. 1935. Pp 410. 21*s*.

THIS book is unique in its approach, the emphasis, as indicated in the sub-title, being laid on the *study* of epidemiology. Prof. Greenwood traces the evolution of ideas on the subject, the part played in these developments by workers in the past being described in a way which captures at once the reader's interest and attention. The book will be found of little value for examination purposes or as a work of detailed reference; it contains no ordinary descriptions of notifiable infectious diseases arranged under the customary headings of incubation periods, infecting organisms, predisposing factors, differential diagnosis, age and sex variations of incidence and fatality-rates, prophylaxis, and treatment. But the reader will gain from it some idea of the methods of approach to the general problems of communal medicine, and—perhaps more important—he will begin to realise something of the vital interest and importance attaching to the skilful analysis of masses of statistical data and the intelligent synthesis of the findings. The author builds upon solid foundations, e.g., the futility of speculation as a means of arriving at the solution of problems, the realisation of the need for basic data, the practical necessity for new and more appropriate technical methods of analysis, and, finally and fundamentally, the application of the principles of ordinary logic to the results. The teaching is clothed in his usual lucid and pungent style.

Prof. Greenwood traces the evolution of epidemiological thought from the times of Hippocrates and Galen, through the age of Graunt and the dawning of interest in the collection and analysis of mass statistical data, to those more recent times in which the knowledge of bacteriology and technical methods of examining data have assisted so materially in the approach to epidemiological problems. In spite of such advances in knowledge and technique, the failure to elucidate the fundamental laws of epidemiological visitations in human experience and the realisation of our essential ignorance of the grammar of the subject ("human populations," the author says, "will not stay put") led to the latest development of investigation upon the simpler and more easily controlled populations of lower animals—an advance with which the author's name is intimately connected. These introductory chapters depict the giants of the past with illuminating sidelights on their personalities, and afford a clear view of the stagnation and periodical spurts in the general advance of knowledge along this path. Three chapters on predisposing factors in communal sickness—nutritional, occupational, and psychological—round off the general part of the book. Representative groups of "crowd" diseases are then dealt with historically and descriptively. Classical epidemics, their investigation, and the reasons for the conclusions reached, are instanced, and the problems of the statistical epidemiology of each discussed, the whole exposition indicating what can be learned of the crowd from this point of view, and how such learning is to be attained. A departure from the usual conception is the inclusion in the discussion of such diseases as tuberculosis, cancer, and venereal disease.

The volume is a contribution to the science of epidemiology which will command earnest and thoughtful study by all students of human health.

Gastritis and its Consequences

By KNUD FABER, M.D., F.R.C.P.E., Hon. Professor of Internal Medicine in the University of Copenhagen. London: Humphrey Milford, Oxford University Press. 1935. Pp. 119. 8*s*. 6*d*.

Prof. Faber has for so long been the champion of that school which emphasises the importance of gastritis that he may well look upon the present decade as one of triumph for his views. Gastritis excites more and more interest in the medical world; it is one of the principal subjects chosen for discussion at the International Congress on Gastro-Enterology being held in Brussels during this week, and the increasing popularity of gastroscopy has added a vast amount of new information on the subject. In this book, which is based on three lectures given at Guy's Hospital in 1934, Prof. Faber summarises his ideas on the whole subject. Many beautiful low and high power microphotographs are included, and the monograph provides strong evidence in favour of his main thesis, which is that gastritis is such a common disease that it is very rare for a normal stomach to exist in an adult person. From this thesis the author goes on to develop the theme that gastritis is a very important ætiological factor in the production of peptic ulcer, and later that gastritis is the all-important cause of anacidity. His inquiries at the University Clinic, Copenhagen, do not support the view of A. F. Hurst that hyperacidity and anacidity are largely a matter of diathesis; he believes that inflammatory disease rather than any inborn or constitutional factor is the important cause of anacidity and hence of pernicious anæmia. As regards cancer of the stomach, on the other hand, he believes that a constitutional or hereditary disposition is of greater importance in ætiology than the presence of gastritis.

This monograph, from one who is, perhaps, the principal exponent of the "gastritis" school, does not impress as entirely convincing. Many lacunæ remain to be filled up before peptic ulcer and pernicious anæmia can logically be placed in the same pigeon hole. The evidence as to the frequency of gastritis is certainly striking, but its acceptance carries with it the corollary that gastritis if very common must often be symptomless.

Diabetes Mellitus and Obesity

By GARFIELD G. DUNCAN, M.D., C.M. (McG.), Associate in Medicine in the Jefferson Medical College, Philadelphia; Assistant Physician to the Pennsylvania Hospital; Chief of the Metabolic Clinic of "B. Service," Pennsylvania Hospital. London: Henry Kimpton. 1935. Pp. 215. 12*s*. 6*d*.

Dr. Duncan, who worked at one time under Dr. F. M. Allen, has written a book which will be very useful to doctors looking after diabetic patients. The physiology and pathology of the disease are clearly described, and the way the diet is arranged is fairly simple, though the food value of vegetables,

fruit and so forth are given in percentages instead of in the much more convenient five gramme method. The instructions for the care of the feet, in order to reduce the risk of gangrene, are very detailed and contain much valuable information. The differential diagnosis between coma due to hyper and hypoglycæmia is very well set out, and stress is laid on the necessity of getting rid of the ketones in diabetic coma as soon as possible. This is accomplished by giving glucose as well as insulin at frequent intervals. A simple way of testing for the presence of acetone bodies in the blood by means of the Rothera reagent is described.

The second part of the book (41 pages) is devoted to an interesting account of obesity. It is estimated that one-fifth of the population of the United States is overweight, and that diabetes is ten to twenty times as frequent in fat people than in those of normal weight. According to this, then, the prevention of diabetes in the elderly people depends largely on the reduction of the number of people who are overweight. A succinct account is given of the causes of simple obesity where no endocrine disturbance can be made out, and the relation of heredity, age, race, sex and occupation. The principles on which a reducing diet is constructed are clear, stress is laid on the importance of not reducing the calories provided by the carbohydrate below one-third or half the total calories of the diet. The specific dynamic action of protein is of little value in increasing the metabolism of the foods in obesity, and it is unnecessary to give large amounts of protein. The fat can be reduced to a small amount. The foods which contain low, moderate and high calories are given in three parallel columns. They do not seem well adapted for the purpose of enabling the patient to choose a diet containing the correct balance between carbohydrate, protein and fat. Some useful tables are appended.

Growth and Distribution of Population

By S. VERE PEARSON, M.D., M.R.C.P. London: George Allen and Unwin. 1935. Pp. 448. 12*s*. 6*d*.

THE main theme of this book is that the proper growth and the rational distribution of population has been hampered throughout the ages by the private ownership of land. The indictment of landlordism is powerful, and the unbiased reader will be impressed with the evils inherent in a system which allows a man through no effort of his own to profit greatly when he happens to own a site which the efforts of the community have made valuable. Dr. Pearson's survey of land tenure extends historically from neolithic times to the present, and geographically from the swamps of Central Africa to modern New York. The remedy suggested is that the ownership of the land should revert to the community (with suitable compensation to landlords in particularly hard cases); rent would then become payable direct to the State and would be sufficient in amount to make other forms of taxation unnecessary. If free access to land were available the author considers that this country would support a rural population, about three times as numerous as at present, who would devote themselves to the intensive cultivation of the land.

In addition to landlords, Dr. Pearson detests contraceptives and water-closets. In the ideal world which he visualises the former would be made unnecessary on account of the greatly increased population which properly used land would support, and these teeming millions would increase the fertility of their fields with the contents of earth-closets from which some fastidious Chinaman had taught them to eliminate all traces of smell. It is also claimed that the abolition of the landlord, by giving the common people free access to land, would cure unemployment and abolish war. It does not require a statistician to perceive that the alternatives of birth control or civil war would arise after a time in any such community, though the calculation of the period during which peaceful expansion would be likely to endure might be difficult even for experts. Not many of Dr. Vere Pearson's readers will share his faith, but all will find stimulus as well as much information in his pages. For a physician who has reached a prominent position in his own branch of medicine to find the time and surplus energy to tackle so difficult a problem of sociology is in itself no mean achievement.

Dietetics for the Clinician

Second edition. By M. A. BRIDGES, B.S., M.D., F.A.C.P., Director of Medicine, Department of Correction Hospitals; Consulting Physician, Seaview Hospital, New York. London: Henry Kimpton. 1935. Pp. 970. 45*s*.

THIS book contains a wealth of information on dietetics which will be valued by English readers. The opening section on the mechanics of digestion is so condensed as to be of small value, but the following chapters, dealing with physiology, vitamins, and the composition of foods, are well written and up to date. The later chapters of the book dealing with the treatment of various diseases by diet contain the views of well-known American authorities such as H. O. Mosenthal, H. W. Blake, and N. T. Saxl. The description of the dietetics of each disease is preceded by a brief description of the pathology and clinical manifestations which is usually very well compiled. It is to be regretted that the differences between British and American menus robs this excellent volume of much of its utility for the English practitioner. The book ends with thirty pages of bibliography and excellent indices.

Pharmacological Action of Harrogate Drinking Waters

By WILLIAM BAIN, M.D. Dunelm, F.R.C.P. Lond., F.R.C.S. Edin., Editor of "A Text-book of Medical Practice." London: J. and A. Churchill Ltd. 1935. Pp. 53. 5*s*.

IN this little book Dr. Bain presents the results of his investigations of the pharmacological action of a number of the waters obtainable at the Harrogate spa. These fall into two main groups, the sulphur and the iron-containing or chalybeate waters, each of which can be further subdivided according to the tonicity of the water compared with the body fluids. His experiments show that on an isolated strip of the rabbit's intestine most of the waters cause an increase in movement with, in some cases, an increased muscle tone, while the intravenous injection of many of the sulphur waters into a pithed animal results generally in an increased movement of the stomach and intestine, and an increase in the tone of the pyloric and ileocolic sphincters. The chalybeate waters have no such effect. His observations on the cholagogic action of the waters lead him to the conclusion that the old sulphur spring water increases both

the quantity of bile and the bile solids, while the strong Montpellier spring water diminishes them slightly. On the isolated rabbit's heart the chalybeate waters produce an increase in systolic contraction and cardiac output, and in the intact animal his experiments suggest that the effect of a mild isotonic sulphur water is to relax the cardiac muscle without any change in cardiac amplitude or blood pressure.

These experiments are interesting, but it is a little doubtful if they warrant the conclusion drawn by the author that Harrogate ought to specialise and concentrate upon two different sets of diseases, viz., affections of the alimentary tract, including the liver, and diseases of the heart. It is difficult to be sure that waters given, as they usually are, by mouth will produce the same effect as they show on isolated tissues or when administered intravenously, and it is by no means certain that an increase in the flow of bile is of much therapeutic importance in most diseases of the liver. In any case, the most powerful known cholagogue, bile itself, is always available. But any serious attempt to lend precision to spa treatment by exact pharmacological experiment is to be welcomed, and we commend Dr. Bain's book to the attention of those interested in the future of our spas.

Pflanzliche Therapie

By Dr. ERNST MEYER, Oberarzt der Inneren Abteilung des Städtischen Krankenhauses, Berlin-Spandau. Leipzig: Georg Thieme. 1935. Pp. 202. R.M. 4.80.

THIS little book deals with the treatment of disease by the internal administration of drugs obtained from plant sources. It attempts to revive interest in the galenical preparations, and may serve a useful purpose on the continent in drawing attention to the fact that drugs may usefully be given by other routes than by intravenous and subcutaneous injection. The first part of the book provides an interesting review of the history and development of plant therapy. In the second part the author deals systematically with the applied pharmacology of plant extracts, while in the third he gives examples of prescriptions classified according to disease of the various systems. While to the ordinary reader many of the drugs advised may be unknown, and the rationale of the use of others be in doubt, the specialist will find the book of considerable value.

A Doctor Talks

By JAMES MCDONNELL, M.C., M.R.C.S. Eng., L.R.C.P. Lond. London: George Newnes Ltd. 1935. Pp. 126. 5s.

THE author's excellent purpose is to persuade the patient to go to his doctor for a diagnosis rather than to the chemist for symptomatic treatment. The style is simple and colloquial; the standard of erudition demanded of readers rather lower than that in a first-aid manual. The hypochondriac, only too often an amateur doctor, will not be satisfied with such elementary stuff and the general public will only find herein that little knowledge which is a dangerous and alarming thing. Dr. McDonnell is at pains to point out that he is not trying to "put the wind up" the reader but at the same time adjures him to make a business of his health—surely redundant advice in this neurotic age. "Fouet's" little humorous sketches are attractive and recall those of Mr. Reynolds in "1066 and All That."

Quarterly Journal of Medicine

IN the July issue (vol. iv., new series) J. S. Westwater (London) gives the results of his study of tuberculin allergy in acute infectious diseases. Now that the Mantoux test has almost superseded the method of Pirquet in clinical work, it is clearly important to know of any condition which may influence its results. The possible suppression of the tuberculin response was investigated in 2000 cases of acute infections, including measles, scarlet fever, chicken-pox, diphtheria, and pertussis. Measles and scarlet fever appeared to cause a temporary depression of tuberculin sensitivity lasting for about a week from the appearance of the rash, and this was thought to be due to the patient's sensitivity having fallen below the reaction threshold as a direct result of the action of the rash on the skin itself. The importance of repeated tests before a negative result to a given dilution could be accepted was clearly demonstrated.—Since loss of weight is one of the commonest precursors of a relapse in juvenile rheumatism, E. C. Warner and F. G. Winterton (London) have made a dietetic study of this disease. They found no signs of undernutrition in rheumatic families as a whole and the rheumatic children were up to the normal standard of physical development for English school-children, though the parents thought their appetites not so good as those of the non-rheumatic. Confirmation was obtained for the mother's statement that the rheumatic child was less fond of meat and fresh fish than the normal child; it also seemed that an increase in animal fat in the form of butter and milk was of prophylactic value. There appeared to be no lack of vitamin-C intake by children in rheumatic families, and the provision of extra vitamin A and D had little or no preventive action.—W. R. Snodgrass (Glasgow) report on the therapeutic use of iodides in the treatment of syphilis. On a basis of 1750 cases he was able to show that iodides had no effect upon the spirochætal content of the lesions of primary and secondary syphilis, but that they caused the resolution of tertiary skin lesions. The optimum dose appeared to be grs. 15 thrice daily, but resolution was accelerated by a single big dose orally or a dose intravenously. Iodides had no influence on the Wassermann reaction in any stage of the infection; iodism could be stopped by an intravenous dose of sodium iodide.—G. R. P. Aldred-Brown and J. M. H. Munro (Bath) have inquired into the connexion between the amount of albumin, globulin, and fibrinogen in the blood-plasma and their ratio to the total proteins, in chronic rheumatic disorders. They report wide variations in the value of the protein, the total protein and the non-protein nitrogen between healthy adults, patients with chronic rheumatic disorders and non-rheumatic persons whose ages and economic stresses were more or less comparable.—E. M. Watson and Marion A. Wharton (London, Ontario) have scrutinised the various dietary measures which have been advocated for diabetes. They hold that no universal rule applies; the type of diet best for a particular patient has to be governed by individual requirements. A high-fat, low-carbohydrate diet lowered or eliminated the insulin requirements of many patients, but it tended to reduce carbohydrate tolerance and favour ketonuria. Conversely, a rise in carbohydrate, provided the fat was kept low, did not necessarily require increased insulin dosage, since it improved tolerance.—Leslie Cole (Cambridge) writes on the treatment of tetanus, with observations by E. T. C. Spooner. This paper was reviewed in a leading article last week.—R. D. Passey and J. McD. Holmes (Leeds) approach the problem of the possible increase in intrathoracic neoplasia from a new angle. They do not think such an increase has been appreciable; nor do they find reason to incriminate the ætiological factors suggested by those who believe the incidence to be rising.

THE LANCET

LONDON: SATURDAY, AUGUST 10, 1935

THE DOCTOR AS ADMINISTRATOR

In the administration of medical services of any kind many affairs of a non-medical character have to be handled. Purchases have to be made, incomes assessed, moneys collected, clerical staffs controlled, and clerical work organised. Lay staffs of various categories are engaged, put to work and supervised. Often, as in the department of a medical officer of health, the lay staff far outnumbers the medical, and in his daily routine the head of the department is concerned with little that is ordinarily regarded as lying within the province of medicine. Is he the sort of officer whose training makes him best suited for the purpose? Or would a lay official at the head of the department be more efficient? Or should a medical officer remain in charge of purely medical affairs, while those of a non-medical character are dealt with by a completely independent officer specially trained in administration? The Hadow Committee, which reported in 1934, addressed itself to problems of this kind in relation to all branches of local government. While suggesting that "local authorities should not always take it for granted that the principal officers must necessarily be technically qualified," it was unable to recommend that any radical change of the existing system was desirable or practicable.[1] There is a tendency on the part of impatient critics to lay too much stress on small flaws in the machinery of administration and to suggest changes which overlook the objects it is intended to achieve. If administration means more than mere business management, handling correspondence, record keeping, filing, supervision of lay staffs, and a close scrutiny of expenditure, if it means the application of scientific knowledge to the betterment of the lives of the people, the guidance of technically qualified assistants, the conveyance of a department's collective experience to those who determine policy, and the application of such policy to the day-to-day work of the department, a professionally qualified head is surely best fitted for the purpose. The Hadow Committee commended the arrangement, already operating in some areas, whereby a senior (but subordinate) official is appointed as a lay administrative officer. This type of appointment appears to have worked well in Manchester and other towns where it has been tried. The chief clerk of any health department is virtually in this position, and it is desirable that the qualifications and training for such posts should be defined and the scales of remuneration sufficient to attract capable officers.

Since the transfer of poor-law functions in 1930, the relation of medical and lay officers in hospitals has been added to the problems of local authorities. The executive officer of a mixed institution is the master, a layman, to whom the medical officer is administratively responsible. Difficulties have frequently arisen in the past and some authorities have overcome them, with the sanction of the Minister of Health, by appointing the medical officer also to be master of an institution which contains a large proportion of sick inmates. There are legal obstacles to this subterfuge but they are not insurmountable, since the Minister may sanction "departures from the regulations."[2] In poor-law hospitals, as distinct from institutions, the medical superintendent quite definitely "governs and controls the hospital and the officers, assistant officers, servants and inmates."[3] Although the steward has specific responsibilities, there is no question as to who is the chief official, since the steward's reports must be submitted through the medical superintendent.[4] This is not a new state of affairs dependent upon the passage of the Local Government Act, 1929, but the tendency to appropriate parts of institutions for medical uses, or to introduce medical control by unification of the appointment of master and medical officer in one person, may account for the discontent among lay officers which has recently been expressed. Thus, according to reports in the lay press, at a meeting of the National Association of Administrators of Local Government Establishments (a rather comprehensive designation) it was contended that a lay administrator should be solely responsible for the departments of supply, maintenance, accounting and recording other than purely medical statistics. It was suggested that many medical superintendents regard stewards of hospitals as nothing more than "glorified office bosses." The idea underlying these and similar protests seems to be that medical men should have no responsibility for non-medical administration in hospitals and that a lay officer should be answerable in such matters directly to the governing body. We sympathise heartily with the desire to relieve medical officers of details of lay administration and commend the Hadow Committee's suggestion to the members of this Association, believing that it is in accord with the arrangement which already obtains in most local authority hospitals and with the requirements of the Public Assistance Order. The Association appears to be anxious to collaborate with the Society of Medical Officers of Health[5] who may be able to assist them in the removal of any real grievances.

Good administration, however, requires that there should be one administrative head of a hospital, who, in the last issue, shall take decisions and justify them to the governing body. The functions of a hospital are the treatment of the sick, the advancement of medical knowledge, the training of nurses, and often the teaching of medical

1 Report of Departmental Committee on Qualifications, &c., of Local Government Officers, p. 34.

2 Public Assistance Order, 1930, Article 8.
3 Ibid., Article 175.
4 Ibid., Article 177.
5 Public Health, December, 1934, p. 106.

students. All problems of administration are ancillary to these objects. What is done and what is bought are more important questions than executive methods. The well-being of the patients and the conditions under which the staff work and learn depend upon the comprehension of the hospital's objects by its administrative head. Clearly these will be attained best under medical administration, provided that medical men—or women—are selected for appointment because of their fitness for this kind of work, and relieved from details not only of lay administration but also of a clinical character. We believe, therefore, that the practice which prevails in local authority hospitals should continue. If it is true, as Dr. R. WORTH stated at a recent meeting of the Royal Medico-Psychological Association, that there is a move on foot to oust the medical superintendent from control of mental hospitals, we hope that it will fail. Further, in that pooling of knowledge and experience which the Act of 1929 was intended to foster, the voluntary hospitals might learn something in this respect from the council hospitals. Outside of Scotland, and with the exception of a very few hospitals in England and Wales, voluntary hospitals have favoured lay administrators. An unprejudiced examination of the relative merits of the two systems by governing bodies of hospitals might lead them to a different point of view. If the voluntary hospitals are to survive, their defects of administration which the developing council hospitals are throwing into relief must be corrected, and medical administrators would be quick to put their fingers on them and force them upon the notice of the managers.

LATENT TUBERCULOUS PERITONITIS

NOTABLE advances have recently been made in the diagnosis of early tuberculous disease and radiology has enabled us to overcome difficulties that but a few years ago appeared to be insuperable. The diagnosis of incipient tuberculosis in joints or bones has been simplified by radiology, and the same means of investigation enables us to diagnose early pulmonary lesions with a confidence and accuracy which a few years ago was impossible. But no such confidence attends our efforts to diagnose abdominal tuberculosis, whether the result of a primary or of a secondary infection. Autopsy may reveal an extensive ulceration of the intestines in a consumptive, although such a condition was entirely unsuspected during life. Laparotomy for an acute appendicitis may reveal a peritoneum studded with tubercles in a patient who was apparently in good health up to the day when acute symptoms developed. The student is taught that tuberculous peritonitis may be acute, subacute, or chronic, that there is an ascitic and a plastic form of the disease, that operation will mysteriously cure the one and less mysteriously fail to benefit the other. A wasted frame and a protuberant belly which provides interesting signs of shifting dullness, or a thrill that may be flicked from one flank to the other under the steadying hand of a colleague, supply evidence of ascitic disease. Cachexia, fever, abdominal discomfort, and bowel irregularities, associated with a "doughy" sensation when the abdomen is palpated, suggest the plastic form. In either instance the disease is one which impresses the mind, and to the fifth-year student the diagnosis of abdominal tuberculosis appears to be a fairly straightforward matter.

In general practice the problem is found to be by no means so simple. An ill-nourished and anæmic-looking child complains of abdominal discomfort, the clinical thermometer registers a low fever, an anxious mother suggests "consumptive bowels," and if her diagnosis is not accepted demands to be informed "what really is the matter with the child." Physical signs are unhelpful and home treatment seems unavailing. The easiest method of dealing with the case is the notification which provides a short cut to a children's sanatorium. If the patient is admitted to a sanatorium, despite prolonged observation and searching investigations, evidence of tuberculosis is seldom forthcoming in cases of this type. Indeed, more often than not a regimen of correct feeding, regular hours and adequate rest results in a rapid amelioration of symptoms, which do not recur until the child returns to the slum tenement or farm labourer's cottage from which he came. Though admissions of patients reputed to be suffering from abdominal tuberculosis are frequent, very few patients retain a diagnosis of tabes mesenterica or tuberculous peritonitis when they leave the sanatorium. As the abdomen contains the digestive system it is not surprising that symptoms arising from digestive disturbance are referred to it and that abdominal discomfort is usually correlated with wasting or malnutrition. The child who suffers from chronic intestinal catarrh may complain of pains, suffer with constipation and fail to gain weight. Flatulent bowels and under-nourishment often suggest, they seldom imply, tuberculous disease. But though a diagnosis of tuberculous peritonitis is often made on insufficient grounds, it is possible that the disease is sometimes overlooked, or its symptoms disregarded until exacerbation of disease or a superadded infection results in its discovery. Laparotomy performed in the early hours of an acute illness may reveal tuberculous lesions so widespread that, unless tubercles grow like mushrooms overnight, we are driven to the conclusion that lesions—the term disease is in some cases inapplicable—have been present for a period of weeks or even months at the time of their discovery.

It has for long been recognised that inflammation of the appendix may be due to an infection by KOCH'S bacillus and the tuberculous origin of a chronic appendicitis or perityphlitis may sometimes be suspected from the patient's appearance, from the clinical picture, and the physical signs in the abdomen. Laparotomy may confirm the diagnosis and reveal the tuberculous origin of the disease at a glance. A Rumanian surgeon, Dr. AT. JANES has recently drawn attention[1] to a

[1] La péritonite tuberculeuse latente, Revue de la tub., February, 1935, p. 193.

curious phenomenon sometimes encountered in patients who have received treatment for "surgical" tuberculosis and who develop symptoms of acute appendicitis. Operation in such cases may reveal an appendix inflamed or containing pus and exhibiting no evidence of tuberculous disease. Nevertheless, ascitic fluid found in the vicinity and inoculated into guinea-pigs may cause tuberculosis. From these observations, Dr. JANES concludes that there is a latent form of tuberculous peritonitis, and that the condition may not give rise to any symptoms of disease. It is noteworthy that the condition was observed in young patients who had suffered from bone or joint tuberculosis, for it is in patients of this type that latent pulmonary tuberculosis is sometimes discovered on X ray examination of the chest. Thus we cannot assume that latent abdominal tuberculosis is a common condition, or that it is apt to occur in children who are not suffering from any recognisable form of tuberculosis in other organs.

NERVOUS DISABLEMENT IN WAR AND INDUSTRY

WE may attribute to the late war the enforced recognition of the importance of the minor psychoses and some of the subsequent growth of interest in their study and treatment. The recent conference of the Ex-Services Welfare Society, which deals solely with ex-Service officers and men suffering from neurological and mental trouble, gives evidence that the original stimulus is still, unfortunately, continuing; for the official subject of discussion was the persisting effect of war neuroses. The conference was concerned not only with men recognised originally as suffering from war stress, but with the late development of disability in those who had not applied for pension until they were finally beaten after years of struggle. It is in such cases that the Society is able to give help that the Ministry of Pensions cannot give. But the Society can do more than that. During and after the war the Ministry not only established clinics but trained already qualified men for service in them; they provided hospitals for those that needed them and freely gave grants and facilities for training to nervously disabled pensioners. The one thing beyond their power was to give continued support to the men in the social and economic struggle, and here the Welfare Society finds its special task. At the conference repeated reference was made to economic difficulties and civil stress, and the hostels and sheltered industries maintained by the Society have been called into being because the essential need of these men is opportunity to work without the combination of uncertainties and rigid demands found in ordinary industrial life. This need is definite, whatever may be thought of the causation or attributability of the men's troubles; without help such as the Society provides, the outlook for many sufferers would be hopeless.

An article by Dr. AUBREY LEWIS in our present issue, on neurosis and unemployment, is concerned with an almost identical problem which, as he shows, calls for similar handling. Whether unemployment produces psychoneurotic trouble is an obvious question; but Dr. LEWIS does not attempt to answer it. His investigations consisted of a detailed examination of the clinical findings, and the occupational and family history, of 52 men referred to a clinic by local public assistance committees because of presumptive mental disorder. All were on out-relief and in the histories there was often abundant evidence of the previous existence of neurosis and, indeed, of a tendency to seek the refuge of pension or compensation. At the same time, out of 38 men to whom this observation applied, 26 gave satisfactory work records or, in other words, had shown themselves at one time to be efficient members of the social organisation. This should be linked with the findings of Industrial Health Research Board investigators that severe psychoneurotic symptoms may exist without producing industrial disability; that is, we may suppose, so long as working conditions are satisfactory to the individual.

Dr. LEWIS concludes that these cases are as much social as medical problems and advocates psychotherapy together with measures which, as he points out, are identical with those already carried out by the Ministry of Pensions and the Welfare Society. He remarks that, as far as psychopathology is concerned, there is nothing to distinguish these men from patients in other walks of life who show similar symptoms, but in their reactions there appears a general attitude of touchiness and resentment that brings them into line with the chronic "compensation or pension-neurosis." We agree that prophylaxis of these disorders must wait on better knowledge, but the development of this unfortunate state of mind clearly deserves more attention than it has hitherto received. Condemnation there has been in plenty; for few writers adopt towards it the objectivity successfully maintained by Dr. LEWIS. Whoever has studied the victims of compensation-neurosis, whether following accidents or in the occupational neuroses, finds among them men, previously decent citizens, who seem to have as their only object the clinging to compensation. In some of them the elements producing that mental attitude can be elucidated. Genuinely incapacitated by nervous symptoms, the man receives little or no skilled help; the symptoms develop unhindered even if he fights against them, and the prospect of again being fit to take up his work begins to recede. It is no one's business to find him work within his power, which is a necessity for his recovery (this situation has long been recognised in miners' nystagmus, the man finding no alternative between going back to work down the pit or drawing compensation). Without understanding of his own condition—the first requisite for successful psychotherapy—he must accept the alternative of compensation and bend all his energies towards retaining it. If to this hypothetical story we add that the nervous sufferer does not thus reason out his behaviour, but reacts

intuitively and emotionally to the situation, we can understand the evolution of the compensation-neurosis in a previously self-respecting and hard-working man. Whatever views we may hold about the fundamental causes of the minor psychoses, the miserable victim of the compensation-neurosis is a social product; among the other admirable work of the Ex-Service Welfare Society and the psychiatric clinics now being established we see these cases at last receiving that attention and understanding that has for so long been lacking.

AN INDEX OF BLOOD REGENERATION

An important stage in the development of each science is the period when man is just able to give exact quantitative expression to the phenomena he is studying. In the past ten years MINOT and his fellow-workers have not only given us a cure for pernicious anæmia and so stimulated an enormous amount of fundamental work on the ætiology and treatment of blood diseases, but they have also given us a method of accurately estimating the degree of hæmopoietic activity and response to therapy—a method which has lent significance to so much recent work on the anæmias. With our issue to-day we publish a supplement by MINOT and CASTLE in which they discuss the exact principles underlying the methods they have perfected for assessing erythropoietic activity by means of the reticulocyte response.

In order to understand these methods it is necessary to recall the relation of the reticulocyte to the mature red cells. In the blood stream of the healthy adult the majority of the red cells are mature. The young nucleated cells (normoblasts) of the marrow are not found, but a small percentage of cells may show a bluish network or reticulum when stained with brilliant cresyl-blue. These cells, because of their appearance, are known as reticulocytes and are young cells intermediate between the normoblast and the mature red cell. Under suitable experimental conditions their development into mature red cells, through stages in which the amount of reticulum gradually decreases, can be demonstrated in vitro. The reticulum is derived from the basophil substance present in the cytoplasm of young nucleated red cells and is not a nuclear remnant. In ordinary films such cells appear as polychromasic red cells, or cells showing punctate basophilia. Increased erythropoietic activity in the bone-marrow from any cause is made apparent in the peripheral blood by an increase in the number of reticulocytes. If activity is great even younger cells of both red and white cell series will appear. The character of the peripheral blood is indeed an extraordinarily accurate mirror of the character of the bone-marrow. When reticulocytes only are found in excess it is usually safe to assume that erythropoiesis is proceeding in a normal way, though at an increased rate; if normoblasts are found there is clearly a greater increase in rate of development, though presumably erythroblastosis is still of a normal type. If even more primitive cells, as primary erythroblasts, predominate, a grossly abnormal type of red cell delivery is in progress. When leucopoiesis is primarily disturbed, as in the leukæmias, the immature white cells afford an index of marrow activity. As far as erythropoiesis is concerned it has been shown by MINOT and others that a careful quantitative estimation of the percentage of reticulocytes appearing in the peripheral blood gives an accurate measure of erythropoietic activity. In anæmia with an aplastic marrow few, if any, reticulocytes are found. In anæmia with an active marrow, as in acholuric jaundice, there is a high output of these cells. In the dyshæmatopoietic anæmias, for instance, pernicious anæmia or leucoerythroblastic anæmia, when marrow activity is arrested, the number of reticulocytes is variable. It is, however, as an index of the effectiveness of any form of treatment that the reticulocyte count has proved of greatest value, for if no interfering factors are present and sufficient quantities of appropriate potent material are given, the output of reticulocytes in any patient is strictly related to the initial number of red cells and hæmoglobin, and can therefore be used as an extremely accurate measure of the efficacy of any therapeutic procedure.

The fact that the principles underlying the interpretation of reticulocyte reactions must be carefully understood, and certain precautions observed if full use is to be made of the information they provide, is emphasised by MINOT and CASTLE. The reactions should be of special value in estimating the potency of different commercial preparations. An important practical point emerges here, namely, that the description of any commercial product should indicate what daily amount is just sufficient to produce a maximal reticulocyte response, which is the only accurate measure of potency. At present, the doctor prescribing one of these preparations is told only the original amount of liver or stomach from which it has been obtained, or the weight in grammes of some constituent—for example, of iron. It is difficult for him to assess the potency of the end product, and it is that alone with which he is concerned. Now that MINOT and CASTLE have added to their previous important discoveries a delicate means of measuring the potency of each member of a whole group of therapeutic remedies, let us hope that it will be speedily put to practical use.

AUSTRALIAN AND NEW ZEALAND ASSOCIATION OF RADIOLOGY.—On May 17th the first annual general meeting of this association was held at Canberra, when Dr. A. T. Nisbet was elected president; Dr. H. M. Hewlett, vice-president; Dr. H. R. Sear, hon. treasurer; Dr. H. M. Cutler, hon. secretary; and Dr. J. G. Edwards, Dr. P. Parkinson, Dr. J. C. Clendinnen, Dr. J. O'Sullivan, Dr. J. S. Verco, Dr. W. Holman, Dr. V. McDowall, Dr. B. L. W. Clarke, Dr. Syme Johnson, and Dr. C. C. Anderson, members of council. The association has been established to promote the advancement and study of radiology and allied sciences and encourage research and experimental work in connexion with those sciences. It is hoped to provide facilities for general conferences and discussions, and supplements to the *Medical Journal of Australia* and the *New Zealand Medical Journal* will be devoted to the work of members.

ANNOTATIONS

NERVE LESIONS AND VITAMIN-A DEFICIENCY

Of late years attention has been directed repeatedly to the possibility that vitamin deficiency is responsible for some forms of degeneration within the central nervous system. In this country E. Mellanby has indicated a probable relationship between vitamin-A deficiency and the so-called toxic degenerations such as ergotism, pellagra, and lathyrism. Extension of this conception to account for the lesions of subacute combined degeneration and disseminated sclerosis has on the whole found less support, although the evidence for such a relationship is suggestive enough to encourage further inquiry along this line. The recent publication [1] of further experimental work by Prof. Mellanby emphasises the importance of the part played by vitamin A in maintaining the integrity of the nervous system especially in young animals. Rabbits of 8–10 weeks old were used in his experiments, and he has found that widespread degeneration of the myelin sheaths in both peripheral and central parts of the nervous system follows the maintenance of these animals on a diet deficient in carotene and vitamin A. Clinically there is stiffness of the limbs, especially of the hind legs, after 2–3 months of this diet and later still xerophthalmia and head movements are observed. Histologically the afferent paths of the nervous system are most affected—namely, the spinocerebellar and spinoreticulothalamic tracts, the posterior columns of the spinal cord and the afferent fibres in both cranial and spinal nerve-roots, excluding, however, such fibres in the vagus nerve. Slight degenerations may develop in the efferent pathways at the same time, but these seem to be exceptional. Mellanby also describes degenerative changes in the neurones on the sensory side but finds it impossible to say whether neurone or fibre is primarily affected.

Although the histological descriptions are based entirely on Marchi preparations (as far as myelin sheath degenerations are concerned), there can be little doubt of the validity of these results in view of the careful controls carried out to eliminate possible confusion with post-mortem artefacts. The importance of the work, which Mellanby describes as being of a preliminary nature, cannot now be assessed. As he says, "the fact that degenerative changes are more easily produced in young animals than in old suggests that these nutritional factors play a large part in determining the structural development of the nervous system, either as a whole or in part, in early life and even in the fœtus. If this is so, it is another instance of the supreme importance of the proper nutrition of the mother during pregnancy and lactation, and of the young child during the development of the nervous system."

PROPHYLAXIS WITH A LIVING PLAGUE VACCINE

At a meeting of the French Academy of Medicine [2] last month Dr. G. Girard, director of the Pasteur Institute of Antananarivo, Madagascar, described further results obtained by the prophylactic use of an attenuated, but living, vaccine of *Bacillus pestis*. Girard and J. Robic had previously brought forward evidence that the living "E.V." strain of *B. pestis* is superior to killed vaccines for preventing plague both in animals and in man. For human beings it had then been used with extreme prudence and without the slightest accident immediate or remote. The further series of inoculations now reported on with this living "E.V." strain of plague were carried out in Madagascar between October, 1934, and May, 1935. A census of the particular district concerned had been made two months previously, and the population (excluding children under two years, who were not vaccinated) was found to be 96,000, of whom 46,879 voluntarily submitted themselves to inoculation. Vaccination centres were established throughout the district, and the vaccine was transported in thermos flasks charged with ice. The reactions to the vaccine were of minor degree and did not prevent the inoculated from continuing their occupations. Afterwards, special care was taken to ascertain the cause of death in the district by bacteriological investigation, and the figures for five months (December to May) are summarised as follows. Among the vaccinated (46,879) the number of deaths from plague was 22, or 0·47 per thousand, and the general mortality 225, or 4·8 per thousand. Among the controls held (these are put at 60,000, which is nearer the true mark than the official census figure of 49,121) there were 100 deaths from plague, or 1·66 per thousand, and the general mortality was 581, or 9·7 per thousand. Girard points out that not only the plague mortality, but also the general mortality was reduced by half among the vaccinated. Septicæmia from *B. pestis* was far less among the vaccinated, and it is emphasised that this is of special importance in a country where *Xenopus cheopis* is widely distributed and capable of transferring the infection. Girard admits that his statistics are in places open to criticism, but maintains that the immunity conferred by the living vaccine, both in animals and man, is evidently superior to that produced by the killed vaccine.

CAN ASCARIS INFECTION BE AIR-BORNE?

In an annotation last year on the prevention of ascaris infection [1] we remarked that, keeping this end in view, controlled experiments were needed on the bore-hole latrine. Since then the suggestion has been put forward [2] that the attraction of this structure for the Indian is likely to be great, seeing that it can be made and used privately close to his own house, and being his own is all the more likely to be kept clean. That is true. But if properly used will it do more good than harm? The bore-hole latrine is a narrow tube, 18 in. across, normally made straight down into the subsoil water, and often with a lining of basket work to prevent its walls from falling in. It has been said that when the tube has reached the subsoil water and is not overworked, fæces will become completely liquid and be lost. But in just such conditions it is well known that this is far from being the end of fæcal bacteria; there may be wide carriage of them by subsoil water, and the suggestion so made becomes in fact one for the deliberate fouling of the usual drink of hundreds of millions of those living in the tropics. Moreover it is wrong to take it as probable that fæces ejected from the anus at the top of a long narrow vertical tube will drop cleanly by gravity into the water at the other end. The fæces of most Indians are normally mushy, and after the passage of a soft stool the bore-hole will be spattered to within a few inches of its top. Moreover the rough holes of the bore or of its lining cannot be cleaned; where fæces have landed, there they must rest. Assuming that

[1] Brain, 1935, lviii., 141.
[2] Bull. de l'Acad. de Méd., 1935, cxiv., 16.

[1] THE LANCET, 1934, ii., 1061.
[2] Indian Méd. Gaz., June, 1935, p. 333.

there are ascaris eggs within them, the question whether embryos which have formed will or will not become parasites in man depends on factors analysed by Anne McRae[3] and H. W. Brown.[4] There is no hatching of the embryo in the sense in which a chick makes its own way out of the shell, for the burst in the ascaris eggshell is made by physical forces acting from without; thus, while chemicals have little effect, the stirring of ripe eggs in wet sand has set free 80 per cent. of the embryos, and after a long car journey the same thing has happened on a great scale in sand culture. Again, when ascaris eggs are dried, an air bubble is formed within the shell, and when they are next wetted osmosis becomes the cause of a break in all the shells and all the embryos become free. The very rough outer coat of the ascaris egg gives the resistance necessary for air-carriage; with air inside it the dry egg will be lightened; and the arrival of the egg on the moist mucosa of the nose should then bring about "hatching." Doubt as to whether air-carriage does or does not take place could, we suggest, be resolved under experimental conditions by use of the hot air thermal precipitator of Whytlaw-Gray and Lomax, referred to by H. L. Green and H. H. Watson.[5] This filters out from air particles varying from 200 μ across to ultra-microscopic size, and it should demonstrate the presence or absence of ascaris eggs. The question of air-carriage in another worm infection is important for the British Army in India, for Colonel W. P. MacArthur has given strong reasons for the belief that *Cysticercus cellulosæ* is conveyed in this way. The effects of this parasite, however, are too grave for its mode of spread to be tested on man or even (with a quiet mind) by man. Accordingly the possibility that ascaris may be air-borne requests investigation not only for its own importance but also for the knowledge it may give of that by *C. cellulosæ* and perhaps by other worm parasites. Here there is no great danger; and here there is a test animal to hand, the pig, on the mucosa of whose nose dried embryonated eggs can be placed.

POOLED HUMAN MILK

THE use of pooled surplus breast milk for feeding premature infants in institutions, or for young babies with severe alimentary disturbances, is being increasingly advocated in this country; but Prof. W. Catel,[6] director of the university children's clinic in Leipzig, throws doubt on the value of human milk for such purposes after it has undergone the heating which is customary. In view of the difficulty of organising and maintaining a steady supply, and the correspondingly high price which has to be paid, his observations demand full consideration. Having compared the morbidity and mortality among premature infants fed on fresh human milk with the corresponding rates among those fed on similar milk heated for three minutes at 100° in a Soxhlet apparatus, he finds that the latter are definitely at a disadvantage; he particularly comments upon the greater frequency of bowel disturbances among those receiving the heated milk. In another series he finds that the daily gain in weight was 25 per cent. less among infants fed on sterilised human milk than among those fed on fresh breast milk; some of the children indeed did better on a cow's milk mixture of similar caloric value than on either form of breast milk. Catel therefore believes that sterilised human milk has no advantages over a cow's milk mixture for the rearing of "delicate" babies. This is an astonishing conclusion, and the number of cases described in detail in his paper is so small that it is impossible to judge whether it is really justifiable. Logically from his observations Catel argues that from the social standpoint schemes for the collection and distribution of breast milk are not worth while. The surplus milk of healthy mothers, used in a fresh state, he still regards as the optimum diet for premature or delicate infants deprived of their own mother's milk, and he argues for a raising of the status of the wet-nurses commonly employed in German institutions.

[3] Jour. Parasitol., 1935, xxi., 222.
[4] Ibid., 1928, xv., 14.
[5] Physical Methods for the Estimation of the Dust Hazard in Industry. Med. Research Council, Spec. Rep. Ser. No. 199, 1935.
[6] Deut. med. Woch., 1935, lxi., 985.

SILENT MASTOIDITIS

ACUTE suppurative otitis media may follow any of several courses. After discharging through a natural or artificial opening of the drum membrane, it may, and as a rule fortunately does, subside with healing of the perforation within a period which varies from a few days to several weeks. Alternatively frank and easily recognisable signs of mastoiditis, and sometimes also of intracranial complications, may develop; or the discharge may persist and become chronic without the appearance of obvious mastoiditis. During the first few days tenderness over the mastoid is common, and most otologists agree that the mastoid antrum and cells are usually involved in the inflammation, but tend to recover in the absence of such adverse factors as extreme virulence of infection, lowered resistance, or obstruction of drainage. Definite mastoid disease and intracranial complications are rare in the first week, and many authorities are convinced that the subsequent course of the disease is unsatisfactory when the mastoid has been opened at this early stage. On the other hand, when the discharge from the ear persists undiminished, even in the absence of other symptoms, for more than about three weeks, it is highly probable that there is suppuration in the mastoid. If nothing is done the best that can be expected is a permanent perforation and chronic suppuration, with its attendant dangers and disabilities. Hence the mastoid operation should be undertaken in such cases, and a surprisingly extensive infection will usually be found.

Dr. George D. Wolf,[1] of New York, who deals with these matters under the title of "silent mastoiditis," quotes Koerner's statement that he has always found bone destruction when there is a profuse ear discharge lasting 4–6 weeks, except perhaps when the discharge is diminishing. He does not define the term "silent mastoiditis" with exactness, but cases are certainly common in which the course of the disease may be described as asymptomatic, atypical, or insidious. There is, however, nearly always a discharge from the ear and usually other signs can be found if carefully sought, such as slight occasional rises of temperature, narrowing of the deep meatus, bulging of its postero-superior wall, or tenderness on deep pressure at some spot behind the ear which, at least after the third week, is a definite indication for operation. It occasionally, though very rarely, happens that a mastoid abscess forms when the membrana tympani is intact, having ruptured and quickly healed or never having perforated; such cases naturally cause great difficulty of diagnosis, but there is always a history of earache

[1] Jour. Amer. Med. Assoc., 1935, civ., 2315.

a few weeks before, the drum is not entirely normal in appearance, and the hearing is somewhat impaired. Apart from such rarities, acute mastoiditis will seldom pass undetected if it be remembered that its development is by no means always accompanied by such obvious signs as severe pain and high fever. The "cortical" mastoid operation is not in itself a dangerous one—Mr. T. B. Layton lately said that from the patient's point of view it is a far smaller operation than the removal of tonsils and adenoids [2]—and nearly always it leaves behind a healed, intact membrane, usually with little or no impairment of hearing. If it were performed in all cases of acute suppurative otitis which show no signs of recovery by the end of the fourth week, a very large proportion of the great mass of chronic aural suppuration would be prevented, a fruitful source of deafness abolished, and the intracranial complications of chronic otorrhœa largely eliminated.

AMBULATORY TREATMENT OF FRACTURES OF THE FEMUR

In cases of fractured femur it is by no means easy to provide support and fixation sufficiently rigid to allow of weight-bearing from the outset. With all his enthusiasm for the unpadded plaster cast and ambulatory treatment in fractures *below* the knee, Böhler[3] nevertheless states that the method of continuous traction is preferred in his clinic for fractures of the femoral shaft. The trouble about fixation with plaster, in these particular fractures, is that the plaster cast does not grip the limb firmly enough to resist the great tendency to deformity at the fracture site—a tendency due mainly to the powerful pull of the thigh muscles, and also (in walking) to the tendency of the upper fragment to "settle down" in the splint. R. A. Griswold,[4] of Louisville, Kentucky, has been so much impressed, however, by the advantages of ambulatory treatment that he has evolved a method—analogous in most particulars to that used in many clinics for fractures of the tibia—by which he believes that ambulatory treatment has been rendered feasible with the assurance of good anatomical and functional results. For such treatment Griswold claims not only the obvious advantage that it shortens the time the patient occupies a bed in hospital, but also that the use of the limb in weight-bearing and walking encourages healing, and helps to maintain muscular strength and normal joint function. Measurement of the circumference of the thigh and calf shows little or no wasting, and, on removal of the cast, as much as 45 degrees of painless movement of the knee-joint may be possible at once.

The principles of Griswold's method may be summarised as follows: The length of the limb is restored by extension; and after the shortening has been corrected, two pins are inserted, one transversely through the distal fragment just above the adductor tubercle, the other in an antero-posterior direction at, or slightly below, the level of the lesser trochanter. By manipulation of these pins, angulation and rotation of the fragments on one another is corrected. The limb, with the correct alignment of the bone-ends restored, and with the pins in situ, is encased in an unpadded plaster cast, which reaches from the xiphoid cartilage to the toes. Walking is permitted as soon as the plaster has hardened. So that the plaster splint may act in the same way as a Thomas's walking calliper—i.e., by counter-pressure on the ischial tuberosity—a roll of padding about 8 inches long, and of the thickness and firmness of a Thomas's splint roll, is placed in situ and incorporated in the plaster. On the perineal side of the thigh the plaster is so modelled as to hold the pad in position and to form a shelf against which the body-weight can be partly supported.

To certain points Griswold draws particular attention. The pins, for example, are not used at all for extension, the correct length being restored before their insertion; and they are thus free for manipulation. By experience, the importance of the proximal pin has been demonstrated. At first a pin was used to correct the posterior angulation of the *distal* fragment of fractures of the lower third of the femur, trusting to the ischial pad to prevent "settling down" of the upper fragment in the plaster case. This plan, however, proved unreliable, and use of the upper pin was adopted. For manipulation and support of the pins, special mechanical arms are attached to the table on which the patient lies for reduction and fixation of the fracture. The properly constructed plaster cast for an adult should weigh about 12–14 pounds. Five patients treated by this method walked on the second to the eighth days following injury; in another 5 cases the same fixation was applied, but on account of other fractures (2 cases), psychosis (2 cases) and transfer to another hospital (1 case), ambulatory treatment was not adopted. The results have been very satisfactory; and for straightforward fractures, without complication, the stay in hospital has been reduced to an average of twelve days.

SENSITISATION TO LIGHT

It is not surprising that so vital an influence as light should find its way into many chapters in the book of medicine. In the fourteenth century John of Gaddesden used red light to diminish the ravages of small-pox in the skin, and there are still practitioners who believe in the efficacy of coloured beams. Comparatively recently Finsen extended light therapy into the invisible regions of the spectrum, and to-day ultra-violet and other forms of irradiation are very widely used. Much remains obscure, however, in the mechanisms by which these remedies do their work. A fact which has a bearing on their action is that the presence of certain dyes and fluorescent substances in the blood stream is capable of sensitising the subject to light—a discovery which was once tentatively applied in connexion with the Finsen treatment of light. The observation that hæmatoporphyrinæmia is associated with hydroa vacciniforme has pointed the way to an explanation of the wide range of diseases (both in man and in animals) which are due to light irritation or which show light-sensitiveness as a characteristic symptom; summer prurigo and actinic dermatitis, lupus erythematosus, and pellagra are examples. In reviewing this interesting subject Dr. Eidinow[1] describes some original work which he has done using eosin, erythrosin, fluorescin, and rose-bengal as light sensitisers. He finds that after these preparations have been injected into the blood stream or the tissues infra-red or luminous rays produce effects comparable with those of ultra-violet irradiation. Thus hæmolysis of red cells suspended in saline, a lethal effect upon infusoria and a raising of the bactericidal power of the blood follow exposure to luminous rays when

[2] THE LANCET 1935, i., 1445.
[3] Böhler, L.: The Treatment of Fractures, Bristol, 1935.
[4] Surg., Gyn., and Obst., April, 1935, p. 848.

[1] Eidinow, A.: Brit. Jour. Derm. and Syph., 1935, xlvii., 277.

sensitisers are present. These are, however, not effective when painted on the skin and they are excreted within a few hours of being injected. This work suggests a possible field of therapeutic research, and Eidinow claims to have had some success in the treatment of lupus and chronic ulcers among other conditions, by the local injection of sensitisers and subsequent exposure to infra-red and luminous radiations.

IN MEMORY OF HUGHLINGS JACKSON

AMONG the tributes to Hughlings Jackson in this centenary year, those of foreigners have a special place. Elsewhere in this issue will be found an account of the commemorative address in which Prof. Otfrid Foerster spoke of the prescient genius of the greatest of English neurologists. At the International Neurological Congress, Prof. Otto Sittig, of Czechoslovakia, who has done much, by translation and exposition, to make Hughlings Jackson's writings accessible abroad, pointed out how he had anticipated modern views about consciousness. From Hungary comes an impressive memorial volume[1] in which the published writings from the Stephen Tisza University in Debreçen are collected and dedicated to Hughlings Jackson, with an appreciatory biographical foreword by Prof. Benedek, the director of the clinic in mental and nervous diseases there and editor of the volume. The papers cover a wide range of topics in neurology and psychiatry, some of them in fields unexplored until recent years. One of the most interesting contributions is a monograph by Prof. Benedek concerning the effects of insulin shock therapy on perception. Insulin had been used in his clinic for several years as a means of combating the disinclination for food in negativistic schizophrenic patients; later it was employed to produce hypoglycæmic shock in schizophrenia, and to a less extent in confusional syndromes. In the patients so treated special disturbances occurred in the perception of forms, space, and movement. The experimental production of psychopathological phenomena by drugs is a field much cultivated of late years; by it our knowledge of the functional capacities and responses of the brain is being enlarged. Other papers, here included, indicate the mutual dependence of neurology and psychiatry, and their common use of the principles so brilliantly divined and laid down by Hughlings Jackson.

MEDICAL RESEARCH IN SHANGHAI

IN his introduction to the report of the first full working year of the Henry Lester Institute of Medical Research in Shanghai, the director, Dr. H. G. Earle, briefly discusses the principles which guide the work of the Institute as a whole, and which have persuaded him to organise the division of medical research into three categories—clinical, physiological, and pathological. In the division of clinical research, interest has been centred upon diseases with a definite nutritional basis or which lend themselves to biochemical investigation on the clinical side. On the surgical side peptic ulcer, appendicitis, and urinary infections are being investigated, supplemented by experimental work into the underlying physiological and pathological processes. In the division of physiological sciences, Chinese diets and foodstuffs have been analysed in regard to vitamin and mineral content. Chinese drug terminology is being studied as it applies to modern medicine, as well as the toxic effects of chaulmoogra salts upon the liver and the reputed diuretic and antipyretic properties of Chinese perilla. In the division of pathological sciences, typhoid, cholera, the bionomics of the mosquito, and the natural history of schistosomiasis—all of which have a water factor—receive attention. A comprehensive study has been made of the distribution of blood groups among the Chinese population in Shanghai, and the material of the associated Lester Hospital permitted the study of blood tests for syphilis—e.g., the influence of high and low temperatures upon flocculation. But the chief interest of the report lies in the important investigations carried out by the department of epidemiology and medical statistics, a section under the immediate supervision of the director. A wide-scale hospital survey—one of the greatest voluntary collective investigations so far attempted—has provided valuable and fundamental data relating to disease-incidence in various parts of China. Hospital populations are usually regarded as providing but a poor index of disease-incidence by reason of the selective factor, but in China, hospitals perform in high degree the duties usually undertaken by general practitioners in other countries, and in this survey a uniform method has been adopted of collecting and classifying data for in- and out-patients treated in scattered hospitals. The survey has stimulated a spirit of inquiry and investigation among many medical workers; it has shown what are the clinical problems with which hospitals have to contend, and had already increased the general stock of knowledge about incidence and distribution of disease in China. Though this work has been discontinued so far as the Institute is concerned — although the machinery is being used in the other divisions—the National Health Administration of China will continue a modified survey on the same lines, The Institute is devoting much effort to popularising research through the medium of public lectures and demonstrations; during the session 1933–34 something like 50 lectures and demonstrations were given in the theatre of the Institute, many of them being illustrated by photographic and cinematographic records produced in its laboratory. These are some examples of what is being done by a well-staffed and liberally equipped institution. Copies of the report, and of papers published by members of the staff, are available on application to the registrar, Lester Institute of Medical Research, Avenue Road, Shanghai, China.

THE ONION AS A SOCIAL PROBLEM

IN the laboratory of applied physiology at Yale University, H. W. Haggard and L. A. Greenberg[1] have been trying to find why an alliaceous odour persists in the breath after eating onions or garlic. It is generally supposed that, like ether, alcohol, and acetone, the essential oil of onion passes into the blood stream and is aerated from the blood in the lungs, so passing into the expired air. Alternative possibilities are that these oils are secreted into the saliva or that the smell comes from the stomach by way of the œsophagus. Haggard and Greenberg will have none of these hypotheses, and they seem to produce conclusive evidence in favour of their own explanation. Their initial experiment was to give 1·5 g. of raw garlic, chewed and swallowed in the ordinary way and followed by the usual odours for a day or more. The same person then took the same quantity chopped in small particles but enclosed in gelatin capsules. No smell whatever was detected

[1] Hughlings Jackson Memorial Volume. Edited by Prof. Ladislaw Benedek. 1935.

[1] Jour. Amer. Med. Assoc. 1935, p. 2160.

in the breath, except once when the subject belched three hours after taking his dose. The investigators thence passed to quantitative tests, where we need not follow them. But all the results go to show that they are right in thinking that the continuing smell of onions or garlic in the breath arises solely from particles retained in the mouth. These particles cannot be completely removed by mechanical means: to brush the teeth and tongue, to wash the mouth with soap and water or even with a 30 per cent. solution of alcohol, will not deodorise the breath. Haggard and Greenberg however are able to propose a remedy which is in fact effective—namely, the rinsing of the mouth with a solution of chloramine, which liberates free chlorine in the mouth and so quickly and completely removes the offending odour. They suggest that many cases of foul breath from other local causes are probably amenable to the same simple treatment, and we hope this may be so. It is salutary, however, to remember the story of the American millionaire who, stimulated by advertisements, spent a large sum on a cure for halitosis; only to find afterwards that his friends did not like him anyway.

A BASE-LINE FOR ASTHMA TREATMENT

FOR asthma there are many remedies but no fundamental cure. While the first task of an asthma research clinic should be to investigate the cause and the mechanism of the disease, it can scarcely avoid an attempt, at once, to assess empirically the value of some well-known therapeutic measures. Since none of these is strikingly and regularly effective, and since the disease is variable in severity and erratic in course, this can be done only from the records of large series of cases adequately controlled. Such a study is under way at the Guy's Hospital asthma clinic, two workers [1] from which have just published, by itself, their series of controls. The group consists of 127 asthmatic out-patients treated by the ordinary general measures—namely, the removal of the most obvious allergens like feathers and orris root, and the prescription of the indispensable ephedrine and adrenaline—together with a weekly subcutaneous injection of normal saline. On this régime of hygiene, symptomatic remedies, and deception half of them lost or nearly lost their asthma for two months. In a further four months a quarter of these had relapsed. The experiment was to be continued for a year, but the results at the end of the second six months are not given. When complete the observations will form a useful yardstick with which to measure the value of such things as vaccines, protein injections, and—possibly the coming favourite—gold. As they stand, they throw into relief the frequency of temporary improvement in the asthmatic after a visit to a new doctor who shows a special interest in him. This phenomenon is familiar to all who treat such patients. It is easily interpreted as the effect of a new remedy but in fact it is usually no more than evidence that "mind and morale play so large a part in asthma."

ACROSS THE FRONTIERS

MANY workers in science, and especially in medicine, get an additional satisfaction from their profession because it is super-national. The pursuit of knowledge and the relief of pain are forms of endeavour containing the germ of a world order: they advance coöperation instead of hindering it, and they make the need for it gradually plainer to all. The past few years have led many men and women in many countries to make sacrifices for their faith in institutions beyond those countries. By mitigating the hardships these people have suffered we can if we wish show belief in the unity of the scientific world; and we have ready means of doing so by support of the Academic Assistance Council established in this country "for the relief of suffering and the defence of learning and science." Under the presidency of Lord Rutherford that council has pursued for more than two years its attempt to help university teachers and investigators displaced on grounds of religion, political opinion, or race, and the successful use of its resources is apparent in the second annual report just issued.[1] These resources remain regrettably slight, and the Council has depended, and still depends, on small subscriptions. Such subscriptions however pull more than their financial weight, since their number "demonstrates general support for the principles of university freedom which the work of academic assistance attempts to defend."

THE ACTION OF TETANUS TOXIN

IN a leading article last week we stated the current belief that the toxin of tetanus enters the central nervous system through peripheral nerve-endings and travels up the axons of the motor nerves. But according to Abel, Hampil, and Jonas,[2] of Johns Hopkins University, this belief is no longer tenable. At present it is generally supposed that voluntary muscles cannot be tetanised until the toxin has been conveyed by the nerves to the anterior horn cells of the spinal cord; when these cells have absorbed the toxin they pass into an over-excitable state and respond more vigorously to kinæsthetic and other sensory impulses, so that a steady stream of motor impulses to the respective muscles keeps them in a state of tonic rigidity. The Baltimore investigators now show that the toxin can be injected in doses of 1/50 to 1/17 of a lethal dose into the trunk of the sciatic nerve of a dog without exerting any action, either local or central, while even larger quantities can be injected intravenously without effect. If the toxin is injected directly into muscles, on the other hand, amounts as small as 1/200 m.l.d. will suffice to tetanise them; and from these and other observations Abel and his colleagues deduce that tetanus toxin has a very powerful direct and specific action on voluntary muscles whose motor nerve terminals are intact—this action being strictly peripheral, like that of curare. They rightly point out that certain well-established facts appear to stand in the way of this theory. For example, when the nerves of a tetanised limb are transected its muscles will relax immediately and completely if they have not been in a state of increased tone for more than a few days; conversely, the muscles of a limb whose nerves have all been completely transected cannot be tetanised to the slightest degree by injecting them with an amount of toxin that will cause the muscles of a sound leg to become completely rigid and remain so for weeks and months. These objections, the investigators think, cannot be sustained in the light of the newer methods which they have used in nerve transection experiments. But for details of these further experiments we are obliged to wait until later papers are published.

[1] Conybeare, L. T., and Witts, L. J.: Guy's Hosp. Rep., 1935, lxxxv., 138.

[1] Academic Assistance Council, Rooms of the Royal Society, Burlington House, London, W.1. Treasurer: Prof. M. Greenwood, F.R.C.P., F.R.S.

[2] Abel, J. A., Hampil, B., and Jonas, A. F., Jr.: III. Further Experiments to Prove that Tetanus Toxin is not Carried in Peripheral Nerves to the Central Nervous System. Bull. Johns Hopkins Hosp., June, 1935, p. 317.

RE-ESTABLISHMENT OF A FRACTURE CLINIC

THE governors of Guy's Hospital have decided to re-establish the fracture clinic there. At the present time cases of fracture are dealt with in various departments: a small proportion goes to the orthopædic department, a few which require open operation are treated by the general surgeons, the remainder falls to the care of the two operating registrars. After-care is a matter for the house-surgeons of the four surgical firms. Under the new arrangement all ambulant cases will be treated at the fracture clinic which will have a permanent junior staff consisting of orthopædic registrar, surgical registrar, orthopædic house-surgeon, and sister in charge of the massage department. Two meetings will be held each week, attended alternately by the senior assistant surgeon and the orthopædic surgeon, who will take charge of the cases attending on their own days. On the third day the surgical registrar will deal with urgent cases to be transferred later to the surgeon sitting at the next clinic. Cases requiring admission will be taken into the hospital under the surgeon of the week; on their discharge they will attend the fracture clinic unless the surgeon under whose care they have been in hospital wishes to continue his supervision. It is a defect of the scheme that the surgeon in charge of the clinic has nothing to do with the care of fractures in the wards, and it may be hoped that this will come later. In the meantime the arrangements for after-care with provision for graduated work will help to shorten the period of incap. ity, of which the systematic follow-up will afford a measure of control.

LYDIA RABINOWITSCH

THE death of Frau Lydia Rabinowitsch-Kempner at her home in Berlin at the age of 63 removes one of the few remaining links with Robert Koch, in whose laboratory she did her early researches on the tubercle bacillus and allied organisms. The daughter of a Jewish merchant, she was born at Kovno, and received her early medical training in Zurich and Berne, going on to lecture at the women's medical college in Philadelphia in the winter and to work in Koch's laboratories in the summer. Her first published work (1897) was on a saprophytic acid-fast bacillus which she found in 60 per cent. of samples of butter taken in Berlin. She then turned her attention to tuberculosis in animals, and published a series of investigations, some of them in conjunction with M. Koch, carried out in the Berlin zoological gardens. This work included some of the earliest work on the avian strain of tubercle bacillus, on spontaneous tuberculosis in wild animals, on hereditary transmission through the eggs of birds, and on Johne's disease. She became editor of the *Zeitschrift für Tuberkulose*, which has stood in the forefront of German research on this subject for many years. One of her last contributions to tuberculosis research was (1927) a typically careful record of work done on the filtrable virus of the tubercle bacillus. But tuberculosis was not the only subject on which she worked with success. When Robert Koch returned from Africa she worked on the trypanosomes under his direction, and in 1902 she went to study the plague epidemic in Odessa with Walter Kempner, another of Koch's assistants, whom she had married four years before. On Koch's death she went to work under Orth at the Pathological Institute, and continued there until her appointment as director of the bacteriological department of the municipal hospital in Berlin-Moabit. Lydia Rabinowitsch will be remembered not only as a pioneer of bacteriology and one of the ablest of Koch's assistants, but as one of the first women bacteriologists. This was recognised by the conferment on her in 1912 of the title of professor.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Comdrs. W. J. Colborne to *Rodney*; T. N. D'Arcy to *President* for course; T. Madill to *Orion*; and C. N. Ratcliffe to *Pembroke* for R.N. Hospital, Chatham.

Surg. Lt.-Comdrs. H. G. Wells to *Drake* for R.N.B.; A. C. Paterson and E. J. Mockler to *Pembroke* for R.N.B.; and R. Russell to *Dryad*.

Surg. Lts. W. M. Greer to *Galatea* and F. M. Duthie to Woolwich.

ROYAL NAVAL VOLUNTEER RESERVE

Proby. Surg. Lt. E. J. S. Woolley to *Ramillies*.

Mr. W. H. Green, of Dartmouth, has been appointed Admiralty Surgeon and Agent for Dartmouth. The following appointments as Admiralty Surgeon and Agent have been approved, to date July 24th: Mr. L. P. L. Firman-Edwards, Ryde; Mr. H. S. Taylor-Young, Salisbury; Mr. R. M. Gordon, Witham, Essex; Mr. R. F. Winckworth, Taunton; and Mr. J. H. Harley Gough, Chichester.

ROYAL ARMY MEDICAL CORPS

Lt.-Col. H. V. Stanley, M.B.E., M.C., retires on ret. pay.

Maj. & Bt. Lt.-Col. W. K. Morrison, D.S.O., to be Lt.-Col.

Maj. E. Percival, D.S.O., M.C., to be Lt.-Col.

SUPPLEMENTARY RESERVE OF OFFICERS

Lt. F. H. Williams to be Capt.

TERRITORIAL ARMY

Capts. A. M. Robertson and E. W. Ashworth to be Majs.

G. Garrett (late Offr. Cadet, Liverpool Univ. Contgt., Sen. Div., O.T.C.) to be Lt.

TERRITORIAL ARMY RESERVE OF OFFICERS

Maj. W. Simpson, from Active List, to be Maj.

ROYAL AIR FORCE

Wing Comdr. J. M. Aloysius Costello, M.C., is placed on the retired list.

Squadron Leader H. McW. Daniel to No. 101 (B) Squadron, Bicester, for duty as medical officer.

INDIAN MEDICAL SERVICE

Majs. to be Lt.-Cols.: E. Cotter and J. M. Shah, M.B.E.

Lts. to be Capts.: J. Edis-Myers, T. K. White, R. de Soldenhoff, C. J. Hassett, R. R. Prosser, E. Parry, W. G. Kennedy, and P. I. Franks.

B. F. B. Russell (substituted for the notifns. in the Gazettes of Jan. 25th and March 15th, 1935).

The undermentioned officers retire: Lt.-Col. V. B. Green-Armytage and Lt.-Col. H. Hingston.

INDEX TO "THE LANCET," VOL. I., 1935

THE Index and Title-page of Vol. I., 1935, which was completed with the issue of June 29th, is now in preparation. A copy will be sent gratis to subscribers on receipt of a post card addressed to the Manager of THE LANCET, 7, Adam-street, Aldephi, W.C.2. Subscribers who have not already indicated their desire to receive Indexes regularly as published should do so now.

SUPPLEMENT TO THE LANCET

THE INTERPRETATION OF RETICULOCYTE REACTIONS

THEIR VALUE IN DETERMINING THE POTENCY OF THERAPEUTIC MATERIALS, ESPECIALLY IN PERNICIOUS ANÆMIA

By GEORGE R. MINOT, M.D., S.D., F.R.C.P.E.

PROFESSOR OF MEDICINE, HARVARD MEDICAL SCHOOL; AND

W. B. CASTLE, M.D., M.S.

ASSOCIATE PROFESSOR OF MEDICINE, HARVARD MEDICAL SCHOOL

(From the Thorndike Memorial Laboratory, Second and Fourth Medical Services (Harvard), Boston City Hospital, and the Department of Medicine, Harvard Medical School, Boston, Mass.)

Introduction

IN the blood stream of normal man very few of the red blood-cells present evidence of immaturity. Although the nucleated red blood-cells of the bone-marrow are never seen, except occasionally in the first few days of life, a small percentage (not over 1 per cent. in adults) of the circulating cells show a bluish network when brilliant cresyl blue is used as a vital dye. The appearance of this precipitated material has earned for such cells the name of "reticulocytes."

With markedly increased bone-marrow activity a few nucleated red blood-cells may appear in the peripheral blood. The leucocytes and blood-platelets may also be increased, with a shift towards an immature formula for the leucocytes. Under these circumstances the number of reticulocytes in circulation is invariably increased. When blood production is only slightly augmented, however, reticulocytes may appear in the blood stream without being accompanied by nucleated red blood-cells. In chronic hæmolytic anæmias increased blood production with increased numbers of reticulocytes may be present over many weeks or even a lifetime. In anæmia due to acute blood loss an orderly rise of reticulocytes in the circulating blood begins, reaches a maximum, and ends within a few days after the hæmorrhage. On the other hand, even with severe anæmia due to diminished blood production in the bone-marrow, the reticulocytes may be no more numerous than normal. If, however, the cause of the diminished bone-marrow activity is removed, there may be a pronounced temporary rise of reticulocytes as the bone-marrow is permitted to respond to the existing anæmia. In pernicious anæmia in relapse, as a result of liver or allied therapy, a similar increase of reticulocytes in the circulation is observed, associated with progressive maturation of the immature cells of the bone-marrow. The general characteristics of the response of the reticulocytes under these circumstances resemble those of the recovery from acute blood loss, in which condition also there is a demonstrable increase in the activity of the blood-forming tissue.

These facts, taken with other evidence, make it clear that the reticulocyte is not a degenerating form but is a stage in the development of the red cell intermediate between the nucleated and the fully adult type. The natural or induced fluctuations of the numbers of these cells in the peripheral blood stream have been used as a satisfactory measure of the activity of the bone-marrow or as a criterion of the effectiveness of certain therapeutic agents in anæmia. The description and interpretation of these so-called reticulocyte responses with particular reference to pernicious anæmia is the object of this communication.

Types of Reticulocyte Response

The rate of blood production in the normal individual is probably regulated by the oxygen tension in the bone-marrow. In the normal individual reticulocytes in increased numbers appear in the blood stream as a result of bone-marrow anoxæmia whether due to high altitudes, chronic carbon monoxide poisoning, or deficient, pulmonary gas exchange. In various types of anæmia the reticulocyte response, whether to acute hæmorrhage, increased red cell destruction, the removal of toxic inhibition of the bone-marrow, or the administration of certain substances in the nutritional deficiency anæmias, is in reality a physiological response to the lowered oxygen tension produced by the anæmia. Liver extract, iron, or, for example, vitamin C, although specifically effective in certain anæmias, do not produce reticulocyte responses in normal individuals or in types of anæmia in which there is no lack of such substances available within the body. Thus, these substances do not act as stimuli to the bone-marrow in the strict sense, but merely permit increased or normal maturation of the red blood-cells. The real stimulus in each instance is the diminished oxygen tension produced by the anæmia.

An increase of the number of reticulocytes in the peripheral blood stream does not, however, necessarily mean an increased delivery of red blood-cells by normal physiological processes from the bone-marrow. Thus, for example, in the progressive anæmia of metastatic carcinoma, of miliary tuberculosis of the bone-marrow, or of leukæmia, the presence of the abnormal cells either acts as an "irritant" to the erythroblastic tissue or else the gross amount of this tissue is so much reduced by invasion that despite the increased activity of the remaining erythroblastic tissue, indicated by increased numbers of nucleated and reticulated erythrocytes in the peripheral blood, the total number of erythrocytes produced is less than normal. The effect of splenectomy in increasing the number of immature cells, including reticulocytes, in the circulation is a variable and not well-explained phenomenon. In

any type of anæmia, especially in the "crises" of hæmolytic anæmias in which the bone-marrow is active, continued reticulocytosis or a sudden increase of these cells does not necessarily herald a significant increase of the total red blood-cell count. If an increased degree of blood destruction or a sudden hæmorrhage occurs, the increased activity of the bone-marrow may be insufficient to make up the deficit of blood.

Moreover, it does not necessarily follow that a reticulocyte response to the administration of certain substances is an index of orderly and progressive physiological activity such as occurs after liver extract or iron therapy in certain anæmias due, respectively, to deficiency of one or the other substance. The administration of many substances, especially by the parenteral route, may lead to an outpouring of reticulocytes and even of nucleated red blood-cells. In general such reactions are erratic and do not usually conform in amount or in time to the characteristic responses resulting from the replacement of a specific nutritional defect. Thus, in the past, foreign proteins, nuclein derivatives, or crude extracts of various tissues, when given by injection, have been claimed to possess specific hæmatopoietic powers because of the subsequent appearance of nucleated erythrocytes or other immature cells and increased numbers of erythrocytes in the peripheral blood stream of normal animals or man. The fact that such responses occur in normal animals or man clearly differentiates the action of such substances from that of liver extract or iron, both of which are effective *only* in anæmias due in whole or in part to their lack. The fact, however, that liver extract given to patients with atypical anæmias or leukæmias, especially by injection, sometimes causes a reticulocytosis, does not exclude the possibility either of an associated deficiency of the substance effective in pernicious anæmia or of a non-specific response to other substances in the relatively crude sources of active material at present available. It is certainly not necessary to conclude that the principle active in pernicious anæmia is producing the effect in some novel fashion.

Potassium arsenite (Fowler's solution) serves as an excellent illustration of a substance which can produce non-specific reticulocyte responses in man. Its oral administration in sufficient quantity will produce such effects in normal individuals, in myelogenous leukæmia, and in pernicious anæmia.[1 2] Moreover, potassium arsenite will depress the leucocytes in myelogenous leukæmia [3] and in normal individuals, and depress the red blood-cell in polycythæmia vera.[4] In pernicious anæmia the reticulocyte responses to the daily administration of potassium arsenite differ in character from those caused by liver extract therapy in that there is not usually a smooth increase and decline in the number of circulating erythrocytes within a period of a few days. Instead, the maximum value of the reticulocytes may be irregularly maintained for several weeks and the total duration of the reaction may be even longer. In further contrast to the specific replacement therapy, there is not an orderly progressive alteration of the age of the reticulocytes towards more mature forms as the days go by. Instead, the number of distinctly young reticulocytes continues to be approximately the same and may be accompanied by showers of nucleated red blood-cells. Moreover, despite this apparent furious activity of the bone-marrow the total red blood-cell count may not rise appreciably or may rise only after a delay of from two to four weeks. By giving as much as 150 minims of Fowler's solution within two days, however, it is possible to contrive a reticulocyte response that resembles rather closely that produced by liver extract in pernicious anæmia. It is possible, however, to show that in pernicious anæmia at the end of many days of elevated numbers of reticulocytes as the result of the administration of potassium arsenite, a complete and typical reticulocyte response to liver extract may be obtained as soon as the reticulocyte response to the arsenic has subsided [2] (see Fig. 1).

It is difficult, therefore, to believe that the action of liver extract and that of potassium arsenite are identical. Since it is even more difficult to believe that pernicious anæmia is a disease due to a deficiency of arsenic, it is evident that the reticulocyte response alone cannot be utilised uncritically as a test of specific physiological activity. Particularly with parenterally administered substances are non-specific effects of various sorts likely to be exhibited. Our own experience has been that preparations containing protein derivatives and known to be inert when orally administered in pernicious anæmia may upon parenteral administration produce reticulocyte responses in certain patients and little or no response in others. The effects originally reported by Morris and his associates [5] from the injection of concentrated gastric juice and more recently analysed by Fouts, Helmer, and Zerfas,[6] very possibly illustrate the same principle. The reticulocyte responses and increases of red blood-cells observed were decidedly more variable in their character and time of onset than would be expected from the parenteral injection of liver extract. In contrast to these phenomena, the reticulocyte responses induced by an acute hæmorrhage in normal man or, for example, by liver extract in pernicious anæmia indicate by their regularity and typical characteristics the physiological activity of the bone-marrow. In each instance if the cause of the anæmia is not re-established respectively by further bleeding or by lapse of the supply of liver extract, the patient's blood becomes and remains normal.

Characteristics of the Reticulocyte Reaction

Reticulocyte responses to the administration of specific substances have been observed in anæmias due to deficiency of liver extract,[7 8 9] iron,[10] and vitamin C.[11] The first of these conditions has received the largest amount of study. The reticulocyte responses in Addisonian pernicious anæmia will be especially discussed below. Subsequent references to liver extract refer to preparations possessing in common with desiccated stomach an effect in pernicious and certain other macrocytic anæmias and not in iron-deficiency anæmias. In addition of course whole liver contains other substances, for example, those effective in hypochromic anæmia (iron and "secondary anæmia" fraction), and in the anæmia of scurvy (vitamin C). The features of the reticulocyte reaction when observed under controlled circumstances are sufficiently uniform to justify certain generalisations. In this communication the percentage, and not the absolute number of reticulocytes in the peripheral blood, will be used as the basis of the discussion. By reference to the total red blood-cell count, the absolute number of reticulocytes can always be calculated. In the interpretation of the reticulocyte responses several factors must be evaluated on the basis of daily reticulocyte counts and frequent determinations of the red blood-cell level.

There are certain general features of the reticulocyte reaction in pernicious anæmia which obtain, whether the active material is given orally or parenterally, in a single large dose or in small uniform daily dosage, provided the amount of material given is sufficient to produce a significant increase of reticulocytes. Almost always within a period of from two to ten days the percentage of the reticulocytes in the

peripheral blood begins to increase and progresses regularly to a maximum value within a period of from three to ten days thereafter. Then the reticulocyte percentage declines steadily over a period of time, usually somewhat longer than that taken for the increase, until it returns to a level close to its original value. When the reticulocyte counts are averaged from observations on several patients given similar amounts of active material, an approximately triangular course or varying height and width is usually observed. The peak reticulocyte value may be approximately the same when determined by single counts on two successive days. More frequent counts near the maximum of the curve often show slightly higher intermediate values which restore the acute apex of the triangle. During the reticulocyte response the age of the reticulocytes, as judged by the amount and character of the granular filamentous substance, shows a progressive transition identifiable as a metamorphosis from young to older forms. Characteristically the increase in the total red blood-cell count may be accounted for up to the peak of the reaction by the increment of reticulocytes. Thereafter, with continued therapy, the red blood-cells increase largely as a result of the delivery of mature erythrocytes. With reticulocyte responses due to small amounts of effective material, the total red blood-cell count may be little increased or may even fall slightly, owing perhaps to an increase of blood volume or to the natural progress of the disease. Indeed, the amount of active principle necessary to cause a maximal reticulocyte response may be less than that required to produce a maximal rate of rise of the red blood-cells. This difference is due to the fact that daily oral doses of material derived from 300 to 400 g. of liver may in individual instances produce apparently maximal reticulocyte responses but a less than maximal rate of rise of the red blood-cells. Analysis of the results obtained in many patients, however (see Fig. 4), demonstrates that, on the average, to produce maximal reticulocyte responses a larger dose is necessary (material derived from 600 g. of liver).

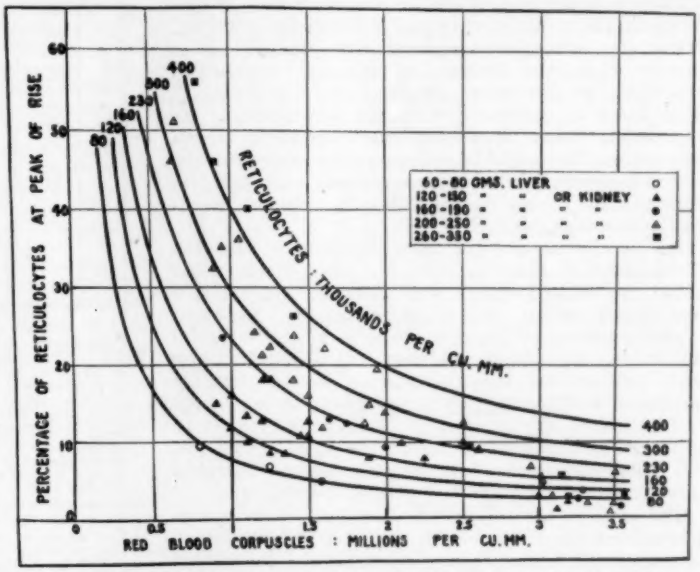


FIG. 2.—Height of the reticulocyte peaks in the responses of individual cases of pernicious anæmia to the daily administration of the amounts of liver or of kidney indicated plotted against the red blood-cell level existing at the beginning of treatment. Note that there is an inverse relationship between the red blood-cell level and the height of the reticulocyte response, and a direct relationship between the latter and the amount of material administered. (From Minot, Murphy, and Stetson.[1])

In *uncomplicated* cases given what have been considered maximum amounts of potent material, the red cells rise *on the average* at very nearly the same rate, no matter whether the substance is given intravenously, intramuscularly, or by mouth. In four weeks the red blood-cells increase, on the average, from the vicinity of 1·4 million per cubic millimetre, by about 2·5 million or slightly more. To be sure, in a series of cases selected at random the average increase of red cells for those given material parenterally will be slightly greater because some of the cases treated orally may have difficulty in absorbing or utilising the material from the gastro-intestinal tract, and because the parenteral dosage commonly used tends to be supramaximal.

In pernicious anæmia, as the red blood-cells rise in response to the administration of active principle, their increase in number frequently outstrips the rate of hæmoglobin regeneration and the changes in physical character of the red blood-cells. An increased mean corpuscular volume becomes normal or less, and the mean corpuscular hæmoglobin concentration and colour-index tend to fall, sometimes below

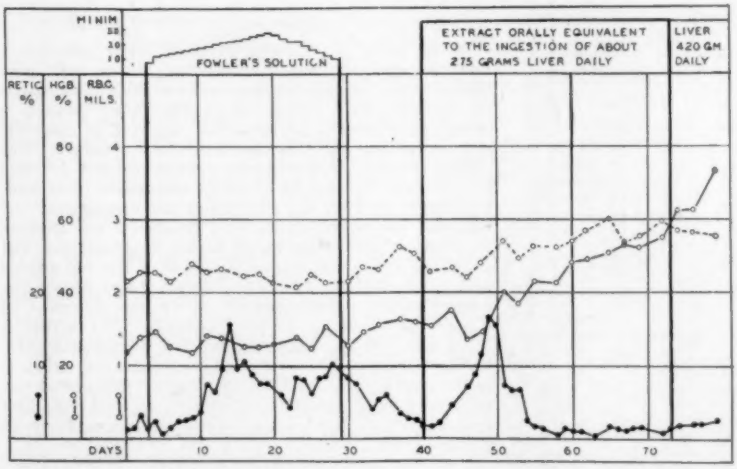


FIG. 1.—Effect of the daily administration in pernicious anæmia of Fowler's solution (potassium arsenite) followed in a subsequent period by liver extract. The reticulocyte response to Fowler's solution, although irregularly maintained for over twenty days, is not associated with a significant increase of the red blood-cells or of the hæmoglobin. The subsequent orderly reticulocyte response to liver extract is typical in time of onset and duration, and is followed by a rapid rise of the red blood-cell count characteristically exceeding the rate of hæmoglobin production, so that the colour-index becomes normal, then less than normal.

normal values. Somewhat the reverse of this process occurs in the response of hypochromic anæmia to iron. Here, the hæmoglobin regeneration proceeds more rapidly than the increase of the red blood-cells, especially as the latter are frequently not greatly diminished as compared with the hæmoglobin. As the colour-index increases, the decreased mean corpuscular hæmoglobin concentration rises and the low mean corpuscular volume, which may increase very rapidly during the reticulocyte response, eventually becomes normal.

In pernicious anæmia there is evidence that the blood-platelets may be increased somewhat earlier than the reticulocytes, and that in general the diminished white blood-cell count is increased towards normal or slightly above in a variable relation to the reticulocyte response. It is worth noting that the patient may sometimes be subjectively improved or show slightly more colour in the hands or face before any changes in the reticulocytes have appeared and frequently before the total red blood-cell count has risen. Likewise the plasma bilirubin may decline sharply as the reticulocytes increase.

The details of the onset, duration, course, and amount of the reticulocyte reaction in pernicious anæmia depend particularly upon (1) the initial red blood-cell level; (2) the amount of active material given; (3) the portal of entry to the body; (4) the rate at which the material enters the body; and (5) the reactive state of the bone-marrow. In the ensuing discussion each factor will be considered in turn, with the assumption that the other four are average and uniform. In the actual interpretation of a given response all the factors must be evaluated.

EFFECT OF THE INITIAL RED BLOOD-CELL LEVEL

If a large uniform daily dose of active material is given to each of several patients with pernicious anæmia, an inverse relationship between the peak value of the reticulocytes and the initial red blood-cell count is observed.[7] This fact is shown by the data plotted in Figs. 2 and 3. The relationship between the initial red blood-cell level and the maximal percentage value of the reticulocyte response holds irrespective of the source of the material or the method of its administration. It is, of course, not proper to compare the absolute values of the reticulocyte peak produced with one type of material or method of administration with those produced by another, but the same material given in identical dosage demonstrates the inverse ratio. In patients with over 3 million red blood-cells per cubic millimetre, the reticulocyte responses become variable and may not appear despite a significant effect upon the total red blood-cell count. It is probable that under these circumstances the demand of the anæmia upon the bone-marrow is not sufficient to cause delivery of immature cells into the blood stream, or that the proliferation of the primitive red blood-cells in the bone-marrow is not sufficient to provide a large amount of tissue for rapid maturation.

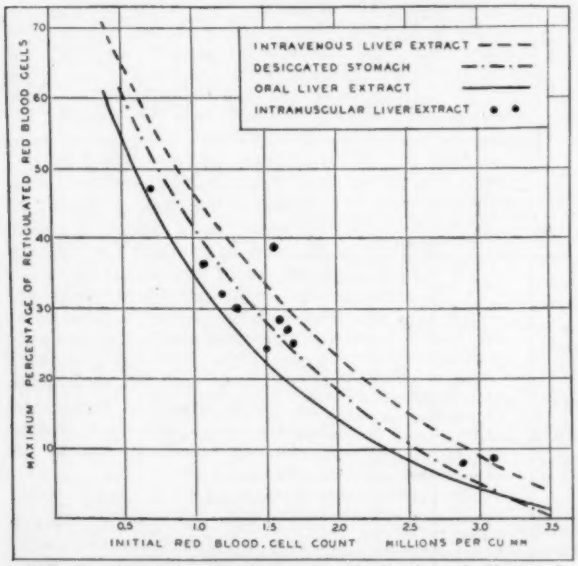


FIG. 3.—Average percentage of reticulocytes at the peak of their rise in response to different types of maximally effective therapy in pernicious anæmia plotted against the initial red blood-cell count. From above downwards the curves indicate average responses from single intravenous injections of extract derived from 100 g. of liver, from the daily oral administration of material derived from 265 g. of pig's stomach, and from the daily oral administration of extract derived from 600 g. of liver, respectively. The solid dots indicate the individual responses of 11 patients given daily by intramuscular injection extract derived from 10 g. of liver. (Based on figure by Bethell and Goldhamer.[13] Some of the data for intramuscularly administered liver extract were kindly supplied by Dr. Raphael Isaacs.)

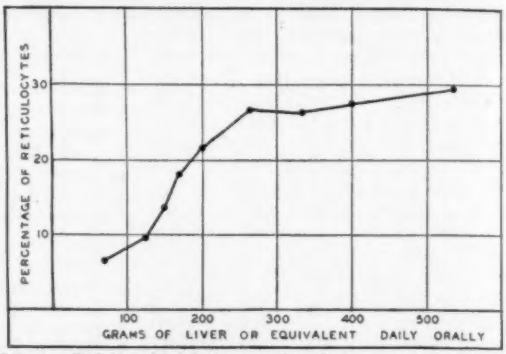


FIG. 4.—Relationship between the dosage and the height of the reticulocyte response to the daily oral administration of liver or of liver extract in a hypothetical case of pernicious anæmia with an initial red blood-cell level of 1·25 million per c.mm. The data are derived from observations with liver pulp or with a liver extract conserving about two-thirds of its potency in 99 patients with initial red blood-cell levels of between 1 and 2 million per c.mm. The expected responses in the hypothetical patient with an original red blood-cell level of 1·25 million per c.mm. were calculated when necessary by interpolation, using the slope of the curve shown in Fig. 2 most closely approximating the data of each observation. The averages so obtained from the daily administration of the amounts of liver or equivalent extract indicated are shown by the individual points on the line.

EFFECT OF THE AMOUNT OF POTENT MATERIAL

If to each of several patients with pernicious anæmia and the same initial red blood-cell level various amounts of effective material are administered in uniform daily dosage, it appears that there is a direct relationship between the amount of material given and the peak of the reticulocyte value. This effect, however, approaches a maximum at a decreasing rate as the amount of active material is increased, as shown in Fig. 4. Thereafter an increase of the amount of active material produces no greater increase of the peak value of the reticulocytes but may accelerate the rate of increase of the red blood-cell concentration. In Figs. 2 and 3 are shown the effects of the administration of various amounts of liver [7] and other potent substances for oral or parenteral use [12 13] upon the production of reticulocytes. Table I. shows the approximate amounts of various sources of active material for oral or parenteral use which may be expected to yield just maximal reticulocyte responses upon uniform daily administration in uncomplicated cases.

EFFECT OF THE ROUTE OF ADMINISTRATION OF POTENT MATERIAL

The effectiveness of liver extract when rectally administered is very slight compared with its activity upon oral administration, according to a few observations. If the same amount of a given active

material is administered in uniform daily doses by mouth and by intramuscular injection in patients with comparable degrees of anæmia, striking differences in the effectiveness of the material are observed. The most accurate comparisons have been made between the effectiveness of the daily oral administration of the liver fraction "G" of Cohn and of the daily intramuscular injection of a dilute aqueous solution of the same material. Although the data are scanty, it is evident that the effect of the daily oral administration of this extract derived from 600 g. of liver is usually no greater than the effect of the daily parenteral administration of the same material derived from 10 g. of liver.[18] Data from certain observations leading to this conclusion are plotted in Fig. 3. It is, therefore, probable that material administered by the parenteral route is at least sixty times as effective as when given by mouth to the average patient. In certain patients, owing possibly to difficulty in the absorption of orally administered material, this ratio is apparently increased. The existence of an intestinal barrier is probably to some extent a physiological phenomenon in regard to the absorption of material in liver extract, iron, and other substances. Whether in certain patients with pernicious anæmia increased difficulty in absorption entirely accounts for the relatively slight effects of the usual oral doses of liver extract has not been finally established (see Fig. 5). There is evidence that the effectiveness of equal amounts of liver extract given intramuscularly in different patients is also variable. Since it is not known with certainty that effective parenteral preparations of gastric tissue can be made, there is no evidence concerning the relative effectiveness of this material when administered by injection.

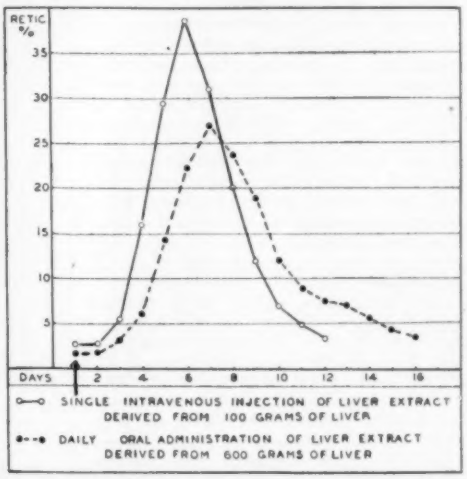


FIG. 6.—Average daily percentage of reticulocytes in patients with pernicious anæmia responding to maximally effective amounts of liver extract administered by a single injection (13 cases) and in uniform daily doses by mouth (20 cases). The average red blood-cell level before treatment for each of the two groups was about 1·2 million per cubic millimetre. (From Minot.[18])

EFFECT OF THE RATE OF ADMINISTRATION OF POTENT MATERIAL

The rate at which the active principle reaches the bone-marrow evidently produces certain modifications in the reticulocyte response. In general the effect of a single massive dose of orally [15] or parenterally [16] administered material is to accelerate the appearance of increased numbers of reticulocytes in the blood stream and to increase the peak value. The tendency for large uniform daily doses of material to cause earlier reticulocyte responses than smaller doses also acts in a similar way. On the contrary, the daily administration of small doses of active principle tends to produce a prolonged low curve with a delayed and not very acute apex. In the case of parenterally administered liver extract, perhaps especially when given intravenously in a single large dose, there may be an additional non-specific or irritant effect possibly augmenting the production of reticulocytes by the bone-marrow, since of course the commercial extracts so far available are far from being pure sources of the active principle.

In Fig. 6 are shown the average daily percentages of reticulocytes resulting from maximally effective amounts of liver extract given intravenously in a single dose and in uniform daily doses by mouth respectively to each of two groups of patients with pernicious anæmia with initial red blood-cell levels in the vicinity of 1·2 million per cubic millimetre. There is a difference of about 42 per cent. in favour of the intravenous injections when the percentages of reticulocytes at the peaks of their rises are compared. If the sums of the daily percentages of reticulocytes above the level of 5 per cent. are calculated, there is still a difference of 17 per cent. in favour of the intravenous injections. By multiplying the daily percentage values for the reticulocytes by the total number of red blood-cells, however, the absolute number of reticulocytes present at each observation can be calculated.[17] When this is done, sums of the daily numbers of reticulocytes poured forth above the basal level of 60,000 per cubic millimetre of blood are found to be, within 1 per cent., the same for each method of administration.[18] Whatever the physiological implications of these facts, it is apparent that in evaluating reticulocyte responses from percentage data for peak values, identical methods of administration must be used. Otherwise certain calculations must be performed with absolute values.

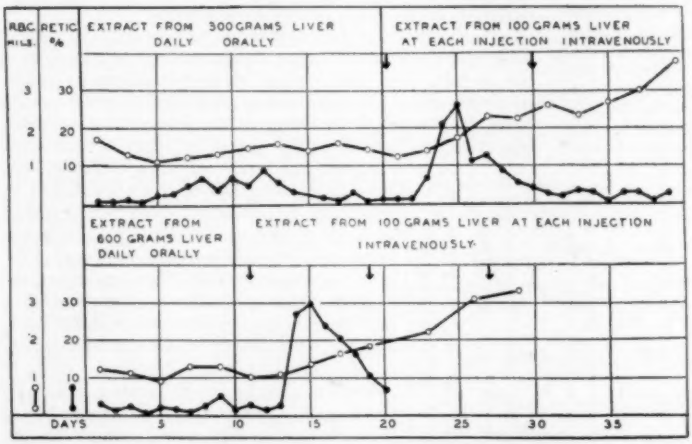


FIG. 5.—Comparison of the effectiveness of a liver extract upon oral and parenteral administration in two cases of macrocytic anæmia. In the upper part of the figure is shown the relatively slight reticulocyte response and effect upon the red blood-cell level produced by the daily oral administration of a liver extract derived from 300 g. of liver, followed by a striking response to a single intravenous injection of the same material derived from 100 g. of liver.

The lower part of the figure shows the negative response in a second patient to the daily oral administration of an extract derived from 600 g. of liver, followed by a striking reticulocyte and red blood-cell response after a single intravenous injection of the same material derived from 100 g. of liver. Note, however, that the peak of the reticulocyte response (30 per cent.) to the latter is not so great as would be expected (47 per cent.) according to the values shown in Fig. 3. This fact suggests that the failure of the patient to react to the orally administered material is not due entirely to difficulty with absorption, but depends to some extent upon ineffectual internal utilisation. (Upper figure from Castle and Taylor: Jour. Med. Amer. Assoc., 1931, xcvi., 1198; lower figure from Castle, Heath, and Strauss: Amer. Jour. Med. Sci., 1931, clxxxii., 741.)

EFFECT OF THE REACTIVE STATE OF THE BONE-MARROW

The discussion so far has been based on the results obtained in the average patient with pernicious anæmia. In addition to a consideration of the fore-

going factors, it is necessary to recognise the fact that certain patients are more or less able than the average subject to develop a reticulocyte response. Thus patients whose initial level of reticulocytes is in the vicinity of 5 to 8 instead of the usual 1 to 3 per cent. may be expected to respond more readily but to give less marked increases at the peak. In general older persons and those with arterio-sclerosis respond less readily than younger ones. Extensive neurological involvement is often associated with slightly lower reticulocyte responses. Severe damage to vital organs, such as the liver, is prone to inhibit reticulocyte responses. By analogy with other anæmias it is clear that toxic factors, such as may be associated with nitrogen retention, may act in a similar way. Infection of a variety of types may greatly inhibit the reticulocyte response. In Fig. 7 is shown the temporary depressing effect of an intercurrent infection upon the bone-marrow response of a patient with pernicious anæmia already responding to liver extract. Difficulty with the absorption of material from the alimentary tract, although not strictly concerned with the reactive stage of the bone-marrow, may, as discussed above, be responsible for lessened reticulocyte responses or even for their absence in certain patients (see Fig. 5).

Theoretically, if acute blood loss has occurred shortly before the administration of specific therapy, the pre-treatment blood level will be lower than that naturally corresponding to the state of the bone-marrow; and the effect of the therapy in producing reticulocytes will really correspond to the blood level existing before the bleeding occurred. If a large transfusion of blood has preceded the administration of active principle, the situation will be reversed in an uncomplicated case. If, however, in such a case some degree of iron deficiency existed, the transfusion might allow an especially large reticulocyte response from the administration of liver extract because hæmoglobin would be supplied to the cells in the bone-marrow at the same time as the active principle of liver extract. In many patients there are probably other defects of nutrition besides the deficiency of "liver extract," especially iron deficiency. The reticulocyte response to liver extract, in such cases of atypical pernicious anæmia as have a less increased cell size than usual or some degree of hæmoglobin reduction, may be retarded by the existence of the additional deficiency. Such an effect is apparently common in the anæmia of sprue.

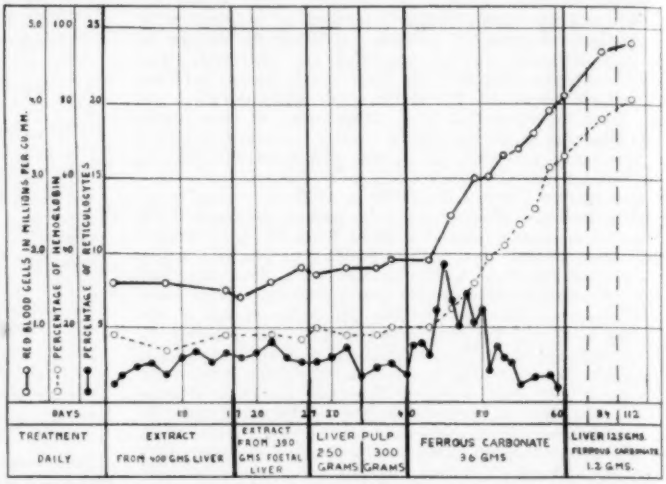

RED BLOOD CELLS IN MILLIONS PER CU MM.
PERCENTAGE OF HEMOGLOBIN
PERCENTAGE OF RETICULOCYTES
DAYS
TREATMENT DAILY
EXTRACT FROM 400 GMS LIVER
EXTRACT FROM 380 GMS FOETAL LIVER
LIVER PULP 250 GRAMS
300 GRAMS
FERROUS CARBONATE 3·6 GMS
LIVER 125 GMS. FERROUS CARBONATE 1·2 GMS.

FIG. 8.—Negative effect of calves' liver preparations and of whole calves' liver in "idiopathic" hypochromic anæmia, followed by a positive effect of iron upon reticulocyte production and red blood-cell and hæmoglobin values. (From Mettier and Minot: Amer. Jour. Med. Sci., 1931, clxxxi., 25.)

Use of the Reticulocyte Reaction as a Test of the Physiological Responses of the Bone-marrow

With due attention to the variables involved, the reticulocyte response may obviously be used to ascertain the reactive state of the red cell forming tissue. The presence of increased numbers of reticulocytes, taken with leucocytosis and increases of blood-platelets, is in general a feature of anæmias associated with increased bone-marrow activity. Such a condition exists more or less constantly in chronic hæmolytic anæmias in which toxic depression of the bone-marrow is not present. Exceptions, due to "irritation" of the marrow in the anæmia of leukæmia or of metastatic disease of the bone-marrow, have been mentioned above.

After an acute hæmorrhage, the height to which the reticulocytes will rise depends on the amount of blood lost and the ability of the marrow to react. Accurate data from animal experiments have recently been published,[19] showing that there is a striking quantitative relationship between the reticulocyte response and the amount of blood lost. Equally good data are not available in man, but unpublished data in our hands indicate that in general the principle has been well established qualitatively. If, after a considerable hæmorrhage, the reticulocytes do not show a wave-like increase, the presence of some deficiency, often of iron, due to previous hæmorrhage or to long-standing defective diet or nutrition, may be hypothecated. Based on these principles, numerous examples of the value of daily observations of the reticulocyte percentage at critical times might be cited. A diagnosis of unsuspected intestinal hæmorrhage may be made as a result of finding the reticulocytes considerably elevated in a patient who has suddenly become weak for no obvious reason. Occasionally chronic carbon monoxide poisoning may be correctly diagnosed because of increased reticulocytes in the presence of a normal red blood-cell and hæmoglobin level.

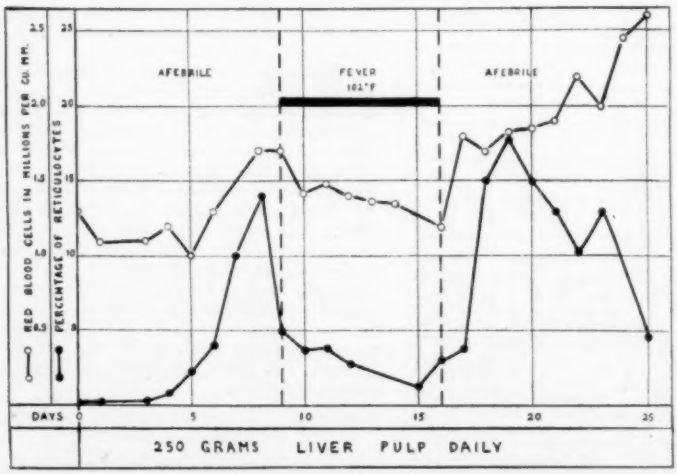


FIG. 7.—Temporary depressing effect of intercurrent infection with fever upon reticulocyte and red blood-cell production during response to the daily administration of liver in pernicious anæmia. (From data kindly supplied by Dr. O. H. Robertson.)

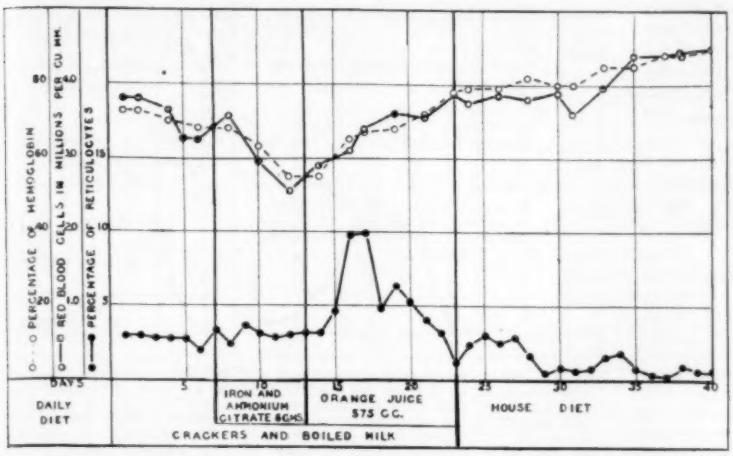


FIG. 9.—Negative effect of the daily administration of iron in a patient with anæmia and scurvy. Note the subsequent reticulocyte response to orange juice and the increase of blood values. The patient was kept on a vitamin-C deficient diet during these observations. (From Mettier, Minot, and Townsend.[11])

In the analysis of the physiological basis of various types of nutritional deficiency anæmias, daily observations of the course taken by the reticulocytes probably constitute the best single criterion. During successive ten-day to fifteen-day periods certain sources of active material are administered in uniform daily doses known to be maximally effective in typical instances of various types of deficiency anæmia.

Thus, in definitely anæmic patients the failure of a reticulocyte response to appear after the parenteral injection of liver extract, or after the oral administration of iron or of orange juice, may be taken to indicate that there is not a deficiency of these substances. Thus the diagnosis, for example, of pernicious anæmia, iron deficiency anæmia, or the anæmia of scurvy, respectively, would be excluded. On the other hand, reticulocyte responses in one or more such successive periods of observation may indicate the respective degree of participation of such factors in the cause of the anæmia. In Fig. 8 is shown the negative effect of liver preparations and of whole liver, respectively, in successive periods of administration in hypochromic anæmia. Finally, the reticulocytes increased with iron therapy and there was a rapid rise of red blood-cells and hæmoglobin. In Fig. 9 is shown the reticulocyte response of a patient with a blood picture resembling very much that of pernicious anæmia. As is seen, the patient while kept on a vitamin-C deficient diet did not respond to iron therapy but showed a typical reticulocyte rise consequent upon the administration of orange juice. The ineffectiveness of purified liver extracts has been shown in other patients with the anæmia of scurvy under similarly controlled conditions. Fig. 10 illustrates the participation of both a deficiency of "liver extract" and a deficiency of iron in the production of anæmia responding with successive reticulocyte reactions to the administration of each of these substances. The blood picture was moderately hypochromic and the response to liver extract unexpectedly revealed the complexity of the deficiency.

The presence of "resistance" to the oral administration of liver extract may be demonstrated by the method of successive test periods. In the lower portion of Fig. 5 is shown the absence of a reticulocyte response in a patient given liver extract derived from 600 g. of liver daily, and the presence of an excellent reticulocyte response to a single intravenous injection of liver extract derived from 100 g. of liver in a subsequent period. Ideally, the observation should have been carried out by the subsequent uniform daily parenteral injection of extract derived from 10 g. of liver in order that the amounts and rates of administration of active principle in each period would be comparable.

Finally, the removal of toxic inhibition of the bone-marrow due to the presence of infection may be demonstrated by following the daily course of the reticulocytes after the elimination of the infection. In Fig. 11 is shown the effect of removing the parasites in a patient with malaria. The temporary increase of reticulocytes, following treatment with quinine, indicates the effect on the bone-marrow of abolishing the inhibition due to fever or in some manner to the presence of the malarial parasites. Had the hæmolytic process only been abolished, the reticulocytes would merely have declined without the distinct elevation after the successful treatment for malaria.

Use of the Reticulocyte Reaction as a Test of the Potency of Therapeutic Agents

SINGLE RETICULOCYTE RESPONSES

Although there are now promising methods for the testing of the material active in pernicious anæmia by the use of animals, the patient is the basis of the present methods for establishing the effectiveness of experimental or commercial products. Despite

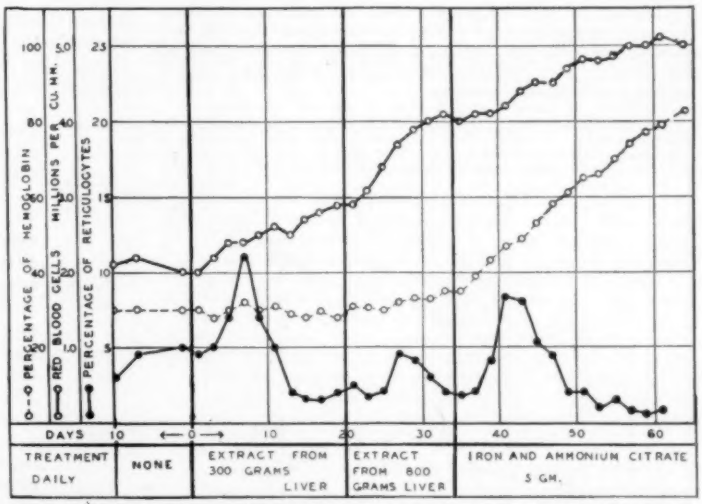


FIG. 10.—Effect of liver extract and of iron in successive period of daily administration in a patient with normocytic anæmia with a moderately low colour-index. Note the three reticulocyte responses: the first from a liver extract ordinarily ineffective in hypochromic anæmia but effective in pernicious anæmia; the second from an increase in dosage; and the third in response to iron therapy. The dominant effect of the liver extract in increasing the red blood-cell count and of the iron in increasing the hæmoglobin level is clearly shown.

much that has been written, it is evidently not clear to many physicians how such tests should be conducted. Therefore the technique of using the single and the "double" reticulocyte reaction method for the determination of the potency of therapeutic substances will be described.

The use of the reticulocyte reaction as a test of comparative potency is applicable only to substances already known from their general clinical and hæmatological effects to be specific.

With substances whose regular clinical effectiveness is not clearly established (e.g., Fowler's solution), a reticulocyte response does not necessarily mean a replacement of a specific deficiency. Especially with parenterally administered substances the possibility of non-specific effects (e.g., concentrated gastric juice) is to be considered. Even with parenterally administered liver extracts, especially in large intravenous dosage, a partial non-specific effect upon reticulocytes may occur. For this reason it is preferable to administer therapeutic substances in uniform daily dosage, and if parenterally, by intramuscular injection. Under any circumstances if a large reticulocyte response appears without a significant increase of the red blood-cells a non-specific effect is to be suspected. Thus if a new product is to be considered effective, not only must it produce an appropriate reticulocyte response, but an appropriate increase of red blood-cells must follow. However, distinctly submaximal dosage of material *known to be clinically effective* will produce a small reticulocyte response for the given blood level, and a significant increase of the red blood-cells may not follow because the quantity given was small.

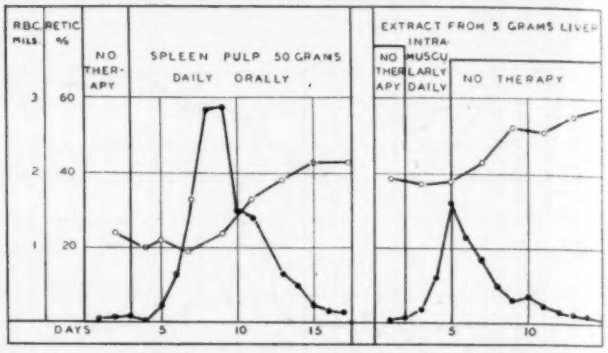


FIG. 12.—Reticulocyte responses in two patients with pernicious anæmia beginning too soon after the initiation of the method of therapy used to be a result of it. The reticulocyte response to spleen pulp began on the second day of administration; and the material was subsequently shown to be ineffective in other patients. The reticulocyte response to the daily intramuscular injection of liver extract began within 24 hours and was actually a typical response to active material subsequently discovered to have been ingested by the patient six days previously.

The reticulocyte response has certain advantages over the method of observing the rate of rise of the total red blood-cell count.

In the first place, it is a more delicate test because reticulocyte responses can be detected following doses of material quite insufficient to produce a distinct increase of red blood-cells. In the second place, if the red blood-cell count is used, it is necessary to allow a much longer period of time to elapse than if the reticulocyte reaction is studied. With the former a period of at least a month is desirable; with the reticulocyte response, ten to fourteen days is almost always sufficient. In either case controlled dietary conditions must be maintained, since the patient's ability to utilise certain foods for the formation of effective material through his own gastric mechanism may be present or especially may return during the induced remission.

When the rise of the red blood-cells is used, the prolonged period is necessary because of the variable interval after the initiation of therapy at which the response begins. Therefore, in order to secure a good estimate of the rate of rise, it is necessary to determine the result over a considerable period. Moreover, the rise of the red blood-cells occurs at a constantly diminishing rate which makes comparisons with different initial red blood-cell values somewhat difficult. Thus, for example, what may be considered an excellent rise in a month from a level of 3 million would be considered an unsatisfactory rise from a level of 2·8 million per cubic millimetre. Finally, the data concerned with the rate of rise of the red blood-cells under controlled conditions have not been so carefully worked out as those concerned with the reticulocyte response.

An objection which applies both to the use of the rise of the red blood-cells and to the use of a single reticulocyte response for evaluating the potency of material is the fact that the results obtained from observations on several patients must be treated statistically in order to eliminate individual variations. By the use of the method of the double reticulocyte response, it is possible to compare in the same patient the effect of one or more substances and so largely avoid the effect of variations in individual susceptibility. In view of the present scarcity of suitable patients and the well-recognised variability of different individuals in their responses, especially to orally administered material, this method has overwhelming advantages.

Before proceeding to a discussion of the double reticulocyte phenomenon, it should be mentioned that data are available for the use of the single reticulocyte peak under certain defined and *adequately controlled* conditions. The factors involved in the reticulocyte reaction have been discussed in detail above, and average values for the expected results, in respect to reticulocyte response (see Figs. 2 and 3), have been given.

The most common error in the use of such data has been the failure to determine what amount of the substance to be tested is just sufficient to produce maximal or slightly submaximal effects

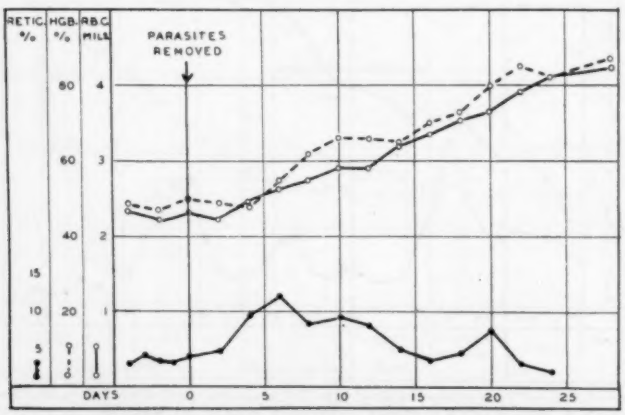


FIG. 11.—Effect of removal of parasites with quinine therapy in a patient with hæmolytic anæmia due to malaria. Note the temporary rise of reticulocytes indicating removal of the inhibition of blood production. This increase of reticulocytes would not have occurred had only blood destruction been abolished.

upon reticulocytes. In the Table are shown the average amounts of various therapeutic agents yielding just maximal reticulocyte responses. Obviously, considerable losses of potency may occur and remain undetected if supramaximal dosage is employed. Thus, for example, in testing the effectiveness of a given product for oral use expected to be just maximally effective in daily amounts derived from 400 g. of liver, the daily dose employed in testing should be that derived from not more than 400 g. of liver. Secondly, particularly in regard to the reticulocyte reaction, the necessity for uniform methods of administration has been neglected, perhaps because the importance of this feature of the test has not been sufficiently realised.

Table showing Approximate Daily Amounts of Substances Necessary to Produce Maximal Reticulocyte Responses in Pernicious Anæmia

Substance.	Original weight in grammes.	Prepared weight or volume.	Route of administration.
Liver or kidney [7]	500	400 g.	Oral.
Desiccated hog stomach [13] ..	250	30 g.	,,
Liver extracts—			
Aqueous concentrate [14] ..	500	65 c.cm.	,,
Precipitate 95% alcohol: fraction "G" [8]	600	27 g.	,,
Dilute solution of fraction "G" [15]	10	2 c.cm.	Im.
Concentrated solution of fraction "G" (commercial)	20	0·6 c.cm.	,,
Liver-stomach preparation [16]	20	4·5 g.	Oral.

Im. = Intramuscular.

The best data available are based either on the uniform daily administration of potent substances or on equal injections of liver extract at intervals of either a week or ten days. It is clear that, in order to compare results upon reticulocytes, the methods of administration must be uniform.

As indicated above, the effect of a single large dose of material or of a single intravenous injection is to produce a somewhat greater percentage of reticulocytes at the peak of their rise than the same dose of material evenly distributed over several days. Sums of the daily numbers of reticulocytes produced during the period of elevation by each method of administration are about the same. Errors in determining the number of red blood-cells or the percentage of reticulocytes will multiply the final error. Obviously, under these conditions irregular and variable dosage renders it impossible to make satisfactory comparisons. It is thus easier to arrange beforehand for a uniform method of administration best suited to the standard data available and to compare simply the peak percentage value of the reticulocytes. Usually this is best effected by giving a uniform daily dose until the reticulocyte peak has been passed. By continuing the administration, the rise of the red blood-cells at the end of thirty days can be used as a check.

If a given uniform daily dosage of a certain preparation is just sufficient in the average patient to produce a maximal reticulocyte response, it cannot be assumed that reduction of the dosage will have a proportionately diminished effect in producing reticulocytes. Since there is a diminishing rate of approach to the maximal effect upon reticulocyte production as the dosage is increased (see Fig. 4), the peak value produced by one-half the maximal dose will not be one-half, but more nearly three-quarters that expected from the maximal dose. It is therefore impossible to draw quantitative conclusions as to the relative potency of different sources of active principle by comparing in a "mathematical" fashion the percentages of reticulocytes produced. Comparisons are best made on the basis of the determination of the amounts just sufficient to produce maximal effects.

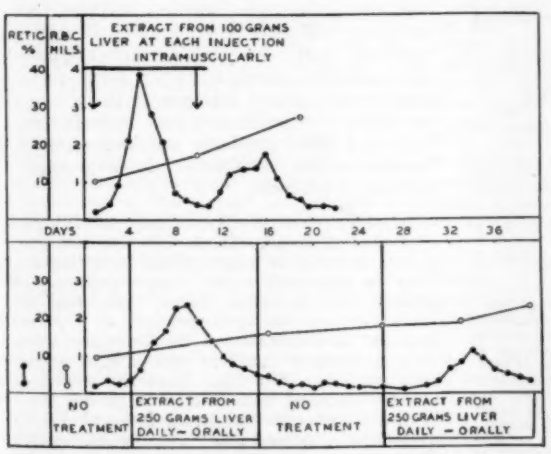

RETIC %
R.B.C. MILS.
EXTRACT FROM 100 GRAMS LIVER AT EACH INJECTION INTRAMUSCULARLY
DAYS
NO TREATMENT
EXTRACT FROM 250 GRAMS LIVER DAILY — ORALLY
NO TREATMENT
EXTRACT FROM 250 GRAMS LIVER DAILY — ORALLY

FIG. 13.—Effect upon reticulocyte production in pernicious anæmia which may occur with discontinuous therapy even when equal amounts of active substance are used. Under these circumstances the appearance of the second reticulocyte response obviously does not indicate the greater potency of the second substance administered.

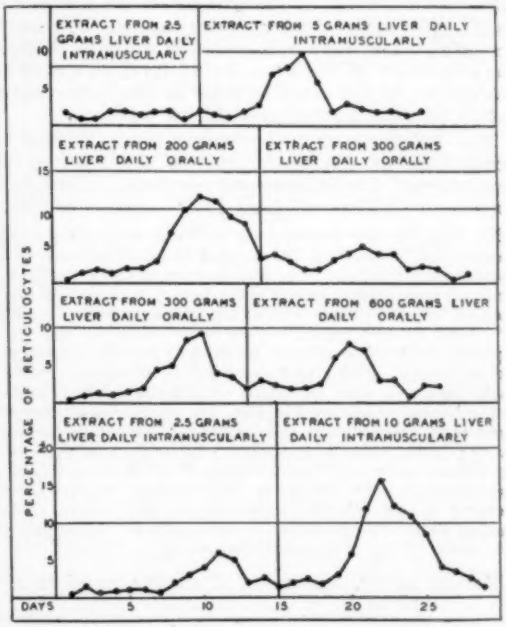

EXTRACT FROM 2·5 GRAMS LIVER DAILY INTRAMUSCULARLY
EXTRACT FROM 5 GRAMS LIVER DAILY INTRAMUSCULARLY
EXTRACT FROM 200 GRAMS LIVER DAILY ORALLY
EXTRACT FROM 300 GRAMS LIVER DAILY ORALLY
EXTRACT FROM 300 GRAMS LIVER DAILY ORALLY
EXTRACT FROM 600 GRAMS LIVER DAILY ORALLY
EXTRACT FROM 2·5 GRAMS LIVER DAILY INTRAMUSCULARLY
EXTRACT FROM 10 GRAMS LIVER DAILY INTRAMUSCULARLY
PERCENTAGE OF RETICULOCYTES
DAYS

FIG. 14.—Observations of "double" reticulocyte responses in each of four patients with pernicious anæmia. In the first patient there was actually no reticulocyte response in the first period. In the other three patients reticulocyte responses, respectively less than, approximately equal to, and greater than the first reticulocyte response appeared in the second periods. The significance of each complete observation is the same: the substance given during the second period was of greater potency than the substance given during the first period.

It is the glory of the medical profession that it is untiring in the service of suffering mankind, but the doctor's humane impulse to "get the patient well" is often oblivious to the austere necessities of scientific observation during the attainment of that desirable objective. The conduct of a controlled observation upon reticulocyte production demands

that the improvement be measurable, not haphazard. The patient will benefit from treatment no less because its effects are critically examined, and his future security and that of other patients suffering from the same disease may depend upon information concerning the potency of the remedy so obtained.

Remarkable as it may seem, attention to such obvious details as the elimination of other sources of active material than the substance under test, or of the complications introduced by blood transfusion or previous therapy, has not always been observed. Thus, it is essential that the patient has not recently received active material or is not receiving it in the diet during the test, in the form of liver or kidneys. If a certain amount of gastric intrinsic factor remains, potential sources of liver extract exist in the form of dietary (extrinsic) factors, such as meat, eggs, whole grains, yeast, and probably other substances. For this reason the diet of the patient should not contain such substances during observations. A control period of a few days is desirable in order to establish the constancy of the reticulocyte level and thus the uniformity of the reactive state of the bone-marrow before the administration of active material.

The following examples serve to emphasise the importance of paying scrupulous attention to the character of the reticulocyte response, especially in respect to its time relations to the test substance.

In Fig. 12 are shown two striking reticulocyte rises immediately following *but not due to administration of the substances indicated*. The response in the first patient to orally administered spleen pulp began within two days; that in the second patient to the intramuscular injection of a liver extract began within twenty-four hours. Such rapidly developing effects upon reticulocyte production are never seen under these conditions of administration; both responses were therefore considered to be unrelated to the therapy indicated in Fig. 12. Subsequent observations with spleen pulp demonstrated its complete negativity; and this reticulocyte response has not been explained except as "spontaneous." The second patient was subsequently found to have taken a considerable amount of an effective commercial preparation before coming under observation, on the sixth day preceding the beginning of the reticulocyte response.

Unfortunately, examples of similar atypical reticulocyte responses have appeared in the literature as evidence of the potency of commercial products.

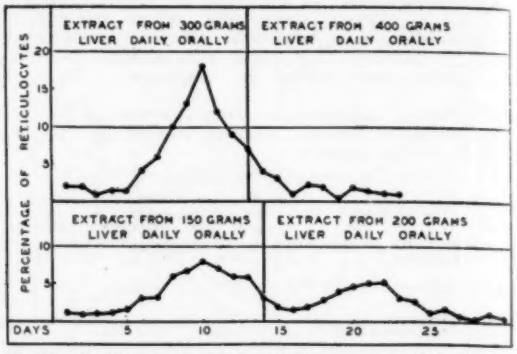

EXTRACT FROM 300 GRAMS LIVER DAILY ORALLY
EXTRACT FROM 400 GRAMS LIVER DAILY ORALLY
EXTRACT FROM 150 GRAMS LIVER DAILY ORALLY
EXTRACT FROM 200 GRAMS LIVER DAILY ORALLY
PERCENTAGE OF RETICULOCYTES
DAYS

FIG. 15.—In the upper part of the figure the relatively large dosage of liver extract (one-half maximal) given a patient with pernicious anæmia has yielded only a slightly submaximal reticulocyte response, and thus prevents a second reticulocyte response when this dosage is increased by one-third. In the lower part of the figure the reticulocyte responses of a second patient to a proportionate reduction of each dosage are shown. During the first period an increase of reticulocytes appeared in response to about one-quarter of the maximally effective dose of liver extract and was then followed by a second reticulocyte rise when this dosage was increased by one-third, as in the first patient.

"DOUBLE" RETICULOCYTE RESPONSES

The method of the double reticulocyte response demands careful attention to detail, but since the variations of different individuals are eliminated and the standards derived from other observations are not critically involved, its interpretation is relatively simple. The principle of the method depends on the fact that the uniform daily administration of a source of active material, large or small, will never produce more than one reticulocyte response unless the reactive state of the patient intermittently changes. If during a period of from ten to fourteen days active material in distinctly submaximal quantity is given in uniform daily dosage, a less than maximal reticulocyte response will appear and decline. Now, if during a second period of days a distinctly greater quantity of the same material is given in uniform daily dosage, a second reticulocyte response will usually result. The technique of conducting such observations and their interpretation will now be considered in detail in reference particularly to pernicious anæmia. The examples cited, however, serve to illustrate certain points common to the use of the reticulocyte reaction not only in responses to liver and allied products but in responses to hæmatopoietic substances in any type of deficiency anæmia.

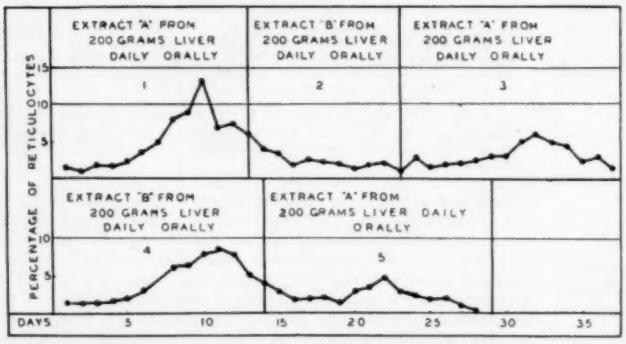

EXTRACT "A" FROM 200 GRAMS LIVER DAILY ORALLY
EXTRACT "B" FROM 200 GRAMS LIVER DAILY ORALLY
EXTRACT "A" FROM 200 GRAMS LIVER DAILY ORALLY
EXTRACT "B" FROM 200 GRAMS LIVER DAILY ORALLY
EXTRACT "A" FROM 200 GRAMS LIVER DAILY ORALLY
PERCENTAGE OF RETICULOCYTES
DAYS

FIG. 16.—Effect of reversing the order of administration of two liver extracts for oral use in pernicious anæmia, an extract A of unknown potency and a standard extract B. Extract A represents a lot of material manufactured according to a process designed to produce material of the potency of standard extract B. It is known that a maximal reticulocyte response can be obtained from the daily oral administration of standard extract B derived from 600 g. of liver. One-third of this dosage is chosen in order to yield a definitely submaximal effect upon reticulocytes. At the end of periods 1 and 2 no conclusion is possible; at the end of period 3, extract A has been found to produce a reticulocyte peak subsequent to the administration of standard extract B derived from an equal amount of whole liver. It is therefore shown to be of greater potency than standard extract B. In a second patient reversal of the order of administration employed in periods 1 and 2 of the first patient is made in periods 4 and 5; and, as in periods 2 and 3, extract A is shown to be of greater potency in terms of original liver than standard extract B.

Necessity for the Uniform Daily Administration of Potent Material.—If an effective amount of potent material is administered in a single oral dose or injection, a reticulocyte response will appear. If, however, later than five days thereafter an identical amount of the same material is administered in the same way, a second, usually smaller, reticulocyte response may occur (see Fig. 13). Since the second dose of the material was exactly as potent as the first, this indicates that in the interval the effect of the first substance was "wearing off," and that the bone-marrow was at least partially ready to respond again. For the same reason if an interval is allowed to elapse between two periods of the uniform daily administration of equal units of active material, a second reticulocyte

peak may be produced (see Fig. 13). A corollary to this situation would be the administration of daily but variable doses of material, since with such a procedure, as with discontinuous therapy, the effect on the bone-marrow would be to some extent variable also. It is evident, therefore, that the "stimulus" to the bone-marrow should in theory be continuously and evenly applied. In practice this can best be done by giving either by mouth or by injection a uniform daily dose of the active principle to be tested. Naturally the route of administration—oral or parenteral—must be the same in both periods of observation.

Necessity for Submaximal Dosage of Potent Material.—If a maximally effective amount of active principle is given continuously during the first period, it is obvious that the bone-marrow will not be able to respond further to an immediately subsequent daily administration of more potent material. Under the conditions defined, a twofold or even a threefold increase of the amount of active principle has no additional effect. Therefore, in the conduct of the double reticulocyte reaction, *it is necessary to know from other observations what will be a daily submaximal dose of the substance under test.* In order to allow the greatest opportunity for a second reticulocyte response due to the administration of material of potentially greater activity in the second period of observation, it is desirable to use in the first period of observation a dose just sufficient to produce a distinct reticulocyte reaction; from a quarter to a third of the maximal dose is usually satisfactory. With such dosage the possibility of a second increase of reticulocytes is facilitated.

Positive Significance of a Second Reticulocyte Response.—If, following the administration of a substance in the first period, there is during a second period an orderly response of reticulocytes, no matter of what degree, to a second substance, this substance is known to be more potent than the first. It is emphasised that this conclusion is justified whether or not there was a reticulocyte response during the first period and whatever the relative magnitude of the reticulocyte response in the second period. Fig. 14 shows in the second periods of four different cases reticulocyte responses of various heights relative to the responses in the first periods. Each is indicative of the greater potency of the second substance. If the absolute numbers of reticulocytes are calculated, the effect of the rise of the total red blood-cell count will be to increase the relative height of the second reticulocyte peak, but its significance will not be altered. It is, of course, essential that the peak of the first reticulocyte response has definitely been passed before the administration of the second substance is begun. The administration of the second substance should never be begun until there have been at least two days on which reticulocyte percentages lower than the peak value have been obtained; and it is advisable to determine that the reticulocyte percentage on the third day is also lower than that on the two preceding days before commencing the administration of the second substance on the third day. It is not advisable to wait until the previous base line has been reached, since this allows an opportunity for too great an increase of the red blood-cell values. There will always be a latent period during the early days of the administration of the second substance before the beginning of the second reticulocyte response. During this time the reticulocyte increase due to the first substance will be further diminishing.

Negative Significance of the Absence of a Second Reticulocyte Response.—If following the administration of a substance in the first period there is during the administration of the second substance no second reticulocyte response, the only conclusion that can be drawn is that the second substance was not shown to be more potent than the first. It is possible that the second substance was merely not sufficiently more potent than the first to produce a second reticulocyte response. Since in order to produce a second response a certain increment of potency is essential, especially at relatively high blood levels, *it is never proper to assume, under these circumstances, that the second substance was less potent than the first,* although this may well be the case. Since the greater the first reticulocyte response the less is likely to be the second, it may be possible to demonstrate, by proportionately reducing the dosage of each substance when given to a second patient (and so producing a smaller first reticulocyte response), that the second substance was actually slightly more potent than the first. Fig. 15 illustrates this point. Because of this fact, in general, the dosage of the first substance given should be as small as possible and still produce a distinct first reticulocyte rise.

Reversal of the Order of Administration.—If there is no second reticulocyte response, especially when the first reticulocyte response has been small, it is possible to decide whether the second substance is less potent than the first by reversing the order of their administration in another patient. Under these circumstances, the absolute or relative dosage of each should be that employed in the first patient. If, in the second patient, a second reticulocyte response is forthcoming, the failure of the second reticulocyte response to appear under the original order of administration is clearly explained; as now the first substance given the first patient has been shown in the second patient to be the more potent. If no second reticulocyte response appears in the second patient, it is clear that neither substance is detectably more potent than the other. By readministering the first substance in the same dosage in a third period in the original patient, the reversal of order may be effected without the use of a second patient. Examples of the results of reversing the order of administration of two sources of active principle are shown in Figs. 16 and 17.

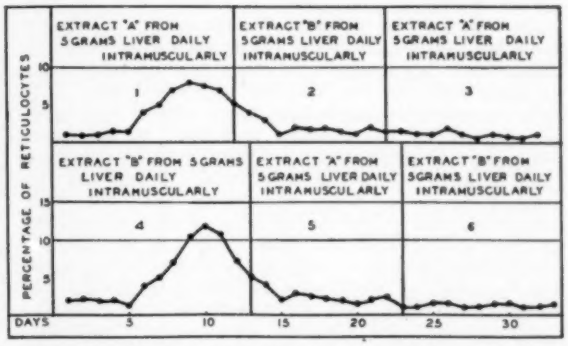

EXTRACT "A" FROM 5 GRAMS LIVER DAILY INTRAMUSCULARLY
EXTRACT "B" FROM 5 GRAMS LIVER DAILY INTRAMUSCULARLY
EXTRACT "A" FROM 5 GRAMS LIVER DAILY INTRAMUSCULARLY
EXTRACT "B" FROM 5 GRAMS LIVER DAILY INTRAMUSCULARLY
EXTRACT "A" FROM 5 GRAMS LIVER DAILY INTRAMUSCULARLY
EXTRACT "B" FROM 5 GRAMS LIVER DAILY INTRAMUSCULARLY
PERCENTAGE OF RETICULOCYTES
DAYS
1
2
3
4
5
6

FIG. 17.—Effect of reversing the order of administration of two liver extracts for intramuscular use in pernicious anæmia, an extract A of unknown potency and a standard extract B. Extract A represents a lot of material manufactured according to a process designed to produce material of the potency of standard extract B. It is known that a maximal reticulocyte response will be obtained from the daily intramuscular injection of standard extract B derived from 10 g. of liver. The first patient presenting an opportunity for a test has considerable arterio-sclerosis and therefore a relatively large submaximal dose, that derived from 5 g. of liver, is given daily. At the end of periods 1 and 2 no conclusions can be drawn. At the end of period 3, since no reticulocyte response appeared, no final conclusion can be drawn. Although it may be suspected that extracts A and B are about equal in potency, the patient's blood values may have risen so much as to prevent a reticulocyte response in period 3. In a second patient the order of administration of similar doses is reversed throughout with the same result. The conclusion is now justified, since neither standard extract B nor extract A is able to produce a second reticulocyte rise after the other, that they are equivalent in potency.

The method of the double reticulocyte response can be most readily utilised when a "standard" substance of known potency is available. Its utility in checking lots of material made by the same process is thus manifest. The substance of unknown effectiveness should be given in the first period in uniform daily amounts derived from that quantity of whole organ which is known, in the form of the "standard," to yield a distinctly submaximal reticulocyte response in suitable patients. If the unknown substance has suffered significant losses of potency in preparation, a reticulocyte rise will occur

when the standard material derived from identical amounts of whole organ is given in the second period. If an increase of potency of the unknown over the standard is anticipated, the standard may be given first for obvious reasons. In this case the absence of a second reticulocyte response calls for a reversal of the order of procedure in another patient (see Figs. 16 and 17).

The establishment of standard preparations for both oral and parenteral administration, which could be supplied on demand to those testing products of any sort, would be a considerable advantage in maintaining the potency of material available for physicians to prescribe for their patients. The practice of describing commercial products only in terms of the original amount of liver, stomach, or other tissue from which each is derived, instead of in terms of the residual amount of active principle, leaves much to be desired. Under this system variations in the potency of different commercial products derived from the same amount of original organ have been shown to exist among substances designed both for oral and for parenteral use.[20 21 22] It is therefore desirable that more critical standards be adopted by the medical profession as the basis for accepting commercial products and for labelling their potency. It is our belief that the reticulocyte method offers the most convenient basis for such determinations. The description of the acceptable product should indicate what daily amount is just sufficient to produce a maximal reticulocyte response. This amount of material may not be sufficient for maximal red blood-cell production, nor is it necessarily the proper dosage for all patients. Measurement of the reticulocyte response to the uniform daily administration of the product *does not imply* that it should be given in daily dosage in practice but does provide a practical method of determining the effectiveness of a given product under controlled conditions within a few days. The use of the double reticulocyte response provides a means of comparing the potency of material with a standard preparation in the same individual.

Summary

1. The circumstances resulting in the appearance of increased numbers of reticulocytes in the peripheral blood stream of man have been reviewed.

2. The probable non-specific or "irritant" effects upon reticulocyte production of certain substances not supplying a nutritional deficiency have been discussed with especial reference to potassium arsenite.

3. The physiological reticulocytoses resulting from hæmorrhage, blood destruction, removal of toxic inhibition of the bone-marrow, and the supplying of substances necessary for the normal development of the red cell have been discussed.

4. A description has been given of the use of the reticulocyte reaction as a measure of the physiological activity of the bone-marrow in certain types of anæmia.

5. The characteristics of the physiological reticulocyte reaction and its relationship to an increase of the red blood concentration, particularly in response to the administration of material effective in pernicious anæmia, have been defined. A discussion has been given of the influence upon the reaction of certain modifying factors in respect to the administration of potent material and the reactive state of the patient.

6. The use of the reticulocyte reaction as a test for the potency of therapeutic agents in deficiency anæmias, especially by means of "double" reticulocyte responses, has been described.

Conclusions

Determinations of the percentages of reticulocytes in the peripheral blood are of value in estimating the activity of the bone-marrow. Characteristic increases of reticulocytes in response to the administration of certain therapeutic agents, when properly correlated with increase of the blood values, are useful in the diagnosis of nutritional deficiency anæmias and in the determination of the effectiveness of therapeutic agents. The possibility of non-specific effects, especially with parenterally administered substances, must be kept in mind.

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COVENTRY AND WARWICKSHIRE HOSPITAL.—Rapid progress is being made with the appeal for £100,000 for this hospital, and Lord Nuffield has promised to give £25,000 when the city has raised £75,000. Less than £12,000 is now required before he will be asked to fulfil his promise.

EDINBURGH ROYAL INFIRMARY.—A warrant has been granted for the erection of the new residence for the nursing staff of this hospital. It is to be built at the south end of Archibald-place where the entrance to George Watson's College was situated. The building is to be six stories high, and will have accommodation for 280 nurses. Each bedroom is to be furnished with built-in furniture and a wash-hand basin. Adequate bathrooms will be provided, and there are to be two shampoo-rooms on each floor. There are also to be rooms for lectures, studies, and writing. A special feature will be a large recreation-room, measuring 77 feet by 30 feet, which will be in the centre of the building on the ground floor. It is to have two sitting-rooms opening off, one at each end, which are separated from the main room by folding partitions which enable the three rooms to be thrown into one for special functions. The main entrance will be from Archibald-place, and four minor entrances communicate with the hospital. Four electric lifts and five stairways will allow easy exit in case of emergency. The estimated cost of the building is £110,000.

PROGNOSIS

A Series of Signed Articles contributed by invitation

LXIV.—PROGNOSIS OF SALPINGITIS

THE peculiar anatomical features, and, perhaps, physiological function of the pelvic peritoneum render the prognosis of suppuration in this region rather different from that of other abdominal abscess formation. The pockets of the pelvis, and probably its more resistant peritoneum, enable infection to be sequestered and pus to be sterilised in many cases of peritonitis which originate from the tubes. Therefore, while there may be no small amount of pelvic invalidism and even acute exacerbation of peritonitis, there is seldom the mortal danger which accompanies abscesses in and around the appendix and gall-bladder.

Non-suppurative Salpingitis

Most cases of acute salpingitis follow gonorrhœa or septic infection at abortion and labour, and, excluding tuberculous infections, there is scarcely any other important cause of salpingitis. The two main varieties of each of these forms are the non-suppurative (or "catarrhal") and the suppurative. The first, or catarrhal variety quickly subsides, leaving no symptoms or physical signs, and may even disappear to such an extent as to leave the tube functionally sound. We are compelled to notice the remarkable powers of complete resolution possessed by the tube because pregnancy has followed undoubted cases of mild salpingitis. The restoration of function obviously depends upon the maintenance of the lumen, and also, we believe, on the integrity of the ciliated epithelium, by which the ovum is propelled towards the uterus. If both ostia are permanently closed the woman must be sterile, and it is probable that any considerable replacement of ciliated epithelium by non-specific epithelium must also be associated with sterility, or what amounts to the same thing—tubal gestation.

Our experience of resolution includes not only cases of the mildest salpingitis which can recover sufficiently to allow a subsequent pregnancy, but even those in which the tubes have been definitely palpable during and inmediately after the acute attack. But despite the undoubted occurrence of complete resolution, the fact remains that by reason of its delicate fimbriæ and ciliated epithelium the tube is a vulnerable organ, and its function is easily impaired by the mildest infections. Should the fimbriæ adhere by the most filmy adhesions the orifice will be blocked; and so narrow is the interstitial portion that it must require only the slightest epithelial desquamation to ensure adhesion of the walls and permanent occlusion. We must therefore regard an attack of even mild salpingitis as a serious event in the reproductive life of a woman, which will probably render her permanently sterile. Some months after the attack has cleared up, the functional prognosis can be settled by X ray examination of the pelvis during the injection of lipiodol into the uterus by an intra-uterine syringe. This test will demonstrate effectively not only if the tubes are occluded, but also the site of the occlusion.

IMMEDIATE RESULTS

The immediate prognosis of acute salpingitis is nearly always good, though operation may be necessary for abscess formation or prolonged tubal swelling with continued temperature. The great majority of all gonococcal cases settle down without danger of general peritonitis, but where the tubes become infected after labour the danger of extending peritonitis is greater because, before uterine involution is complete, the tubes are abdominal rather than pelvic organs. Not only is their anatomical situation a potential danger, but the infection may be highly virulent and prone to spread rapidly. In these cases salpingitis is usually only a comparatively minor part of a widespread or generalised infection of far greater importance than the local focus in the tubes. Salpingitis after abortion is less immediately serious as the tubes have not been carried up out of the pelvis by the enlarged uterus, but it is liable to be followed by abscess formation or chronic interstitial salpingitis. The rare occasion on which acute salpingitis follows curettage of the apparently normal but infected uterus is nearly always fatal on account of the severity and rapid spread of the accompanying peritonitis.

LATE RESULTS

The later results which may follow an average attack of acute non-suppurative salpingitis are an important part of the consideration of any given case. The possibilities are: (1) resolution, or, if not complete functional restoration, such disappearance of all active infection as to prevent any further recurrence of signs or symptoms; (2) the formation of a permanently thickened tube with closed abdominal ostium, and containing a small amount of sterile, turbid fluid (interstitial salpingitis); (3) rarely, pyosalpinx or tubo-ovarian abscess of varying size, adhesions, and toxicity; and lastly, (4) hydrosalpinx, which may be a thin-walled sac formed by the tube distended by clear fluid.

The clinical outlook will depend upon the pathological legacy of the acute attack, and to a lesser extent on the manner of life and social status of the patient. Where even mild permanent changes are left, such as thickening of the tube wall, adhesions of the tube, ovary, gut, and uterus, there will be some disability for a varying number of months or years, which will gradually disappear as the tubal condition becomes more and more an obsolete lesion. The disability will take the form of pelvic pain or discomfort caused by fatigue and menstruation. There will probably be some increase of menstrual loss on the first day or two, and leucorrhœa, but on the whole the symptoms are mild and strikingly dependent upon fatigue, overwork, and mental stress. If the woman can live a life of ease she will have little trouble, but if she is a working woman either as the non-salaried, active mistress of her own house and family, or as a regular salaried worker in somebody else's house or factory, she will find that her pelvis is her heel of Achilles. As time goes on, however, and with due care, rest, and symptomatic treatment, the symptoms gradually subside, and the pelvic weakness is forgotten. There is much evidence to this effect to be found during the course of pelvic operations. During laparotomy, done for some other condition, the tubes may be found thickened, closed, and adherent, though there may have been no immediate complaint of pelvic symptoms. The patient has obviously had salpingitis and still carries its final anatomical results, but she has, perhaps, long ceased to know of its existence. The steady, if lengthy, course of improvement is always liable to interruption, however, if the woman is overworked, contracts a "chill" just before or

at the beginning of menstruation, or as some evidence shows, develops a severe attack of influenza.

Suppurative Salpingitis

After an attack of true suppurative salpingitis the subsequent course is not so simple. The tube is left as a sealed sac containing pus. The immediate convalescence may require three weeks before the temperature returns to normal, and though the pus may gradually become "sterile" as far as ordinary bacteriological examination can show, yet the patient is very liable, almost inevitably liable, to have repeated exacerbations of symptoms due to recrudescence of local tubal peritonitis. On these occasions the clinical features of the original attack are reproduced, and again one can feel the tender fixed tubal swellings alongside and behind the uterus. Not only will she suffer these repeated attacks of pelvic illness, but during the intervals she will never be really robust and well. She may lose weight and have a toxic appearance, while menstruation will be too frequent, excessive, prolonged, and painful. Secondary conditions, such as anæmia, bacilluria, and metastatic "rheumatic" foci are also possible complications.

PROGNOSIS AFTER OPERATION

While medical treatment will usually succeed in the former group, there is no hope except from operation in the latter group in which "chronic" tubes contain actual pus. It is well, however, to remember that immediate and complete recovery to normal health will not follow the removal of pyosalpinx. If the tubes, and probably infected portions of the ovaries, are alone removed, the patient will certainly lose those symptoms which are the direct outcome of harbouring pus anywhere in the body, but unless the uterus, which is inevitably also infected, congested, and enlarged, is also removed the patient is still left with all the troubles of menstruation and leucorrhœa. It is theoretically conceivable that after the adjacent abscesses have been removed the uterus would gradually return to normal, but in fact the process is either very slow, or else fails entirely, and the patient, even after so remedial an operation as removal of pus sacs, may still find herself a menstrual invalid, with only a few days in the middle of the month of comparatively good health.

Hysterectomy, especially for a young woman, may appear to be too radical, but actually the ultimate results are better, and as the woman would anyhow have been sterile, the operation will not have deprived her of potential child-bearing. If the operator hesitates during the operation, mindful of the youth of his patient, of her recent marriage, maybe, and of the added time and difficulty of hysterectomy—and individual circumstances should always render every decision a special one—he should remember the interstitial portions of the infected tubes, and therefore remove a wedge-shaped piece of the fundus to include them. Convalescence is always prolonged. It may be months, even a year or more before good health is regained. Much, if not all, depends upon how far menstrual symptoms disappear, for it is the oft-recurring depression of health combined with excessive loss of blood which holds her back from complete recovery.

We are often asked about the effect of the operation on *sexual feeling*. Normally, removal of pyosalpinx will not only not depress it, but will actually increase it by improving the general health, but where the ovaries have been sacrificed as a part of suppuration there may be, but by no means necessarily, some gradual fading of sexual feeling. Much depends upon the type of woman. Some women suffer no loss whatever either after the menopause or double oöphorectomy, whereas others find that their sexual life has finished. It is probably safe to say that the outlook in this direction is determined more by the degree of sexual activity and development of the woman than by the surgical deprivation of certain endocrine influences.

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SPECIAL ARTICLES

INTERNATIONAL NEUROLOGICAL CONGRESS

(*Concluded from p. 269*)

Discussions

THE CEREBRO-SPINAL FLUID

IN opening a discussion on the physiology and pathology of the cerebro-spinal fluid, Dr. L. H. WEED (Baltimore) said that in the developing embryo the appearance of the choroid plexuses corresponded with the extraventricular spread of the cerebro-spinal fluid. Whether the fluid was a true secretion or a filtrate depended upon whether the cells of the choroid plexus did work in its formation. Lewis Flexner's investigations supported the view that the fluid was a secretion. Dr. Weed's own researches had shown that the factors influencing the absorption were the difference between the hydrostatic pressure of the fluid and the sagittal venous pressure, together with the osmotic pressure of the blood. In quadrupeds the hydrostatic factor was small and the major effective force was the osmotic pressure of the blood colloids, which was equivalent to 250 to 300 mm. of saline. The Monro-Kellie doctrine that the volume of the cranial contents was constant, though modified in details, was essentially sound.

Prof. G. SCHALTENBRAND (Würzburg) gave an account of the evolutionary history and the anatomical structure of the choroid plexuses, the lepto-meninges, the Virchow-Robin spaces, and the arachnoidal tufts. He showed lantern slides illustrating the microscopical changes in the cells of the choroid plexuses, which were believed to be contemporary with the formation of cerebro-spinal fluid. He described the effect of osmotic changes on the circulation of the fluid.

Mr. HUGH CAIRNS (London) discussed the treatment of hydrocephalus. There were at least eighteen causes of hydrocephalus in infancy and it was obvious that an accurate diagnosis must precede effective treatment. Hydrocephalus in adults might be due to a congenital membrane blocking the foramen of Magendie, incision of which afforded relief. The ætiology of otitic hydrocephalus, which sometimes followed otitis media or mastoiditis, was incompletely understood. It was characterised by an increase in the volume and pressure of the cerebro-spinal fluid in which the protein content and cells were abnormally low. Papilloedema was the most important symptom. The condition subsided spontaneously in time, if the patient were treated with repeated lumbar puncture.

Mr. Cairns also spoke on post-operative hydrocephalus following the removal of a tumour from the posterior fossa, cystic loculations of fluid after removal of intracranial tumours, cerebral œdema, and cerebral shrinkage.

Prof. F. GEORGI (Yverdon) dealt with the physico-chemical basis of the formation and resorption of the cerebro-spinal fluid. He emphasised the difficulty of drawing a conclusion from the physical and physico-chemical properties of the fluid and equally from the presence in, or absence from, the fluid of hormones or immune bodies. He thought, however, that a process of simple dialysis could be excluded as the mode of formation of the fluid. Drs. ORZECHOWSKI, BOSCHI, and ZANDT also contributed to the discussion.

FUNCTIONS OF THE FRONTAL LOBES

The discussion on the functions of the frontal lobes was opened by Prof. J. A. BARRÉ (Strasbourg). He said that under the name of ataxie frontale Bruns had drawn attention in 1892 to certain disorders of balance in stance and gait which he had observed to be associated with tumours of the frontal lobe and which resembled cerebellar ataxia. The recognition of ataxia as a symptom of a frontal lobe tumour was of value in drawing the attention of the clinician to the need for diagnosing frontal lobe tumour from tumour of the cerebellum. Prof. Barré, however, was critical of Bruns's conception and said that "fronto-cerebellar ataxia" was neither ataxia nor frontal nor cerebellar. He considered that retro- and retro-latero-pulsion were the disorders of equilibrium most characteristic of a frontal lobe lesion, especially when they occurred early. He also discussed the apraxie de marche of Gerstmann and Schilder, which he considered to be a complex psychomotor disorder, the product partly of mental deterioration and partly of astasia-abasia.

Prof. P. DELMAS-MARSALET (Bordeaux) also discussed the functions of the frontal lobe in respect of equilibrium. Experimental investigations, he said, yielded evidence that the prefrontal lobe was concerned in coördination. From the clinical standpoint it was possible to recognise four fundamental elements in the symptoms of frontal lobe lesions, a cerebellar disorder, a labyrinthine disorder, an apraxic and an agnosic factor.

Dr. K. GOLDSTEIN (New York) referred to the relations between the frontal lobes and the psychic functions. There was ample evidence that lesions of the frontal lobe, especially if they occurred on the left side, were associated with psychic disturbances, which were not necessarily limited to a single mental function. The defect which was found in all functions bore a close relationship to the particular situation which called a particular type of behaviour into play. Psychical symptoms themselves were not sufficient to determine a differential diagnosis. It was not accident that the mimic movements, language and writing, which were of such great social importance, should be represented in a part of the forebrain, near that which was concerned in psychical functions.

Dr. CLOVIS VINCENT (Paris) described the functions of the frontal lobe from the standpoint of the neurosurgeon. He said that in certain conditions partial or total resection of the lobe gave rise to no definite psychical or motor disorders. In the neighbourhood of the third ventricle there was a mechanism whose excitation or paralysis led to a sudden swelling of the frontal lobes brought about by vascular congestion and œdema. Epilepsy, and particularly status epilepticus, might be related to this vascular disturbance in the frontal lobes. Distension of the ventricular system was capable of producing mental symptoms similar to those of a frontal lobe tumour.

Dr. R. M. BRICKNER (New York) reported his study of a unique patient who had undergone removal of both frontal lobes for meningioma, Broca's area and the motor cortex being left intact. An analysis of the resulting mental disorder supported the view that only one function was impaired—namely, the elaborate association or synthesis into complex structures of the simpler engrammic products associated in the more posterior parts of the brain. Dr. Brickner summed up the functions of the frontal lobes as the production of "ingenuity"; but more than ingenuity was required if man was to achieve a harmonious and intelligent control over his emotions.

THE HYPOTHALAMUS AND CENTRAL REPRESENTATION OF THE AUTONOMIC NERVOUS SYSTEM

The last discussion was opened by Prof. C. U. ARIËNS KAPPERS (Amsterdam), who described the phylogenetic development of the autonomic hypothalamic centres in fishes, amphibia, reptiles, and birds, compared with the lower mammals. The ontogenetic development and normal conditions in man were dealt with by Prof. W. E. LE GROS CLARK (Oxford).

Prof. J. LHERMITTE (Paris), speaking on the anatomo-clinical syndromes of the hypothalamus, said that the neural functions of the hypothalamus were indissolubly linked with the pituitary gland, the posterior or nervous lobe of which was a prolongation of the brain. The question of whether a certain syndrome was hypothalamic or infundibulo-tuberal was identical with the inquiry whether one should seek for the cause of the trouble in the vegetative centres of the hypothalamus or in a primary endocrine disturbance. He reviewed the present state of our knowledge of the anatomy and physiology of the hypothalamus and then described the syndromes which could be attributed to lesions in this region. These were diabetes insipidus; essential polyuria; essential polydipsia; polyphagia; glycosuria; sleep disorders; disorders of the sexual functions; the lipodystrophies; diencephalic obesity; hypophyseal cachexia; disorders of the hæmopoietic functions; diencephalic epilepsy; and disorders of temperature regulation. The pathological disorders responsible for these syndromes included syphilis, tuberculosis, the acute encephalitides, tumours, and hydrocephalus.

Prof. A. W. ADSON, of the Mayo Clinic, described the physiological effects produced by ablation of the autonomic central influence by interrupting sympathetic pathways in the treatment of various diseases. He paid especial attention to Raynaud's disease and stated that although the cause of the pathological vasoconstriction had not been settled, observations following sympathetic ganglionectomy, trunk resection, and ramisectomy had strongly suggested a central control. The effect of sympathectomy in the treatment of congenital megacolon, disorders of the bladder, and essential hypertension were also discussed.

Prof. O. LÖWENSTEIN (Nyon) reported experimental researches on the manifestation of physical and psychophysical constitution in the vegetative nervous system. By means of cinematographic records he had been able to make a graphic representation of the behaviour of the pupils in various conditions and he exhibited graphs showing the timing of pupillary constriction and dilatation. There were several forms of normal response which he considered to be indicative of psychophysical constitution types.

Prof. LARUELLE, Dr. HIRSCH, Dr. SPATZ, and Prof. GRUNSTEIN also took part in the discussion, which was brought to a close by Prof. B. BROUWER (Amsterdam).

Short Papers

Some 250 short papers were presented to the Congress. Epilepsy attracted the greatest interest, since apart from the discussion which occupied the whole of the first day there were over forty papers on this subject. The autonomic nervous system occupied the second place with 27 papers, and intracranial tumours and the surgery of the nervous system came next with 18. It is impossible to report more than a selection of the communications read.

EPILEPSY

Dr. W. G. LENNOX (Boston) read a paper on the relationship of unconsciousness in human subjects to cerebral blood flow and to anoxæmia. A study was made of blood leaving the brain in unanæsthetised human subjects with reference to loss of consciousness. These fell into two groups. In one were those in whom the unconsciousness was preceded by a sharp fall in the volume of cerebral blood flow or was accompanied by a very low oxygen saturation of the blood leaving the brain. In the second group were those carotid sinus cases, and one hysterical, which had no preliminary fall in blood pressure. These had a decrease in neither the flow nor the oxygen saturation of the blood leaving the brain. The experiment suggested that even acute cerebral circulatory failure or anoxæmia was not the exclusive explanation of the loss of consciousness but was only a stimulus to a neural mechanism.

Dr. F. A. GIBBS and Dr. E. L. GIBBS (Cambridge, Mass.) described the convulsion threshold of various parts of the cat's brain. Experiments with a needle electrode on 400 cats had shown that not all parts of the cat's brain were equally sensitive to electrical stimulation, and there was evidence that the structure from which convulsions were most readily excited was a short fibre system running between the frontal cortex, basal ganglia, and the thalamus. The conclusion was drawn that convulsions were produced by a specialised neural mechanism in the brain, a mechanism which was at least as well localised as that which controlled dilatation of the pupils.

MM. PAGNIEZ, PLICHET, and LAPLANE (Paris) discussed the rôle of cutaneous parasites in the production of experimental epilepsy. They had found that the epilepsy of Brown-Séquard in the guinea-pig depended upon the multiplication at the epileptogenous zone of the neck or face of cutaneous parasites (mallophages), which are normally to be found in all guinea-pigs. The suppression of these parasites led to the complete disappearance of the epilepsy, which recurred on their return. A lesion of the sciatic nerve was in no way necessary for the production of the epilepsy and merely acted by favouring the multiplication of the parasites.

Dr. K. CONRAD (Munich) spoke on the rôle of heredity in the ætiology of epilepsy. His study was chiefly concerned with the incidence of epilepsy among uniovular and binovular twins. Seventy per cent. of uniovular twins showed a concordance, as compared with 11·5 per cent. of binovular twins.

X RAY DIAGNOSIS

Recent advances in the radiology of the nervous system were embodied in a series of papers from Prof. E. Moniz's clinic at Lisbon. Prof. MONIZ himself read one on angiography in the diagnosis of brain aneurysms and angiomas, and gave an account of the technique necessary to obtain pictures of both the arteries and the veins of the intracranial circulation.—Dr. LUIZ PACHECO (Lisbon) described the displacements produced in the cerebral arteries by tumours of the frontal, parietal, and temporal lobes, and Dr. FERNANDO DE ALMEIDA (Lisbon) presented normal arteriograms and phlebograms of the brain.—Dr. A. LIMA (Lisbon) spoke on the technique of cerebral angiography.

Dr. E. W. TWINING (Manchester) reported on the radiological study of the third ventricle. The methods used had proved valuable, he said, in differentiating supratentorial from intratentorial lesions, in lesions near the chiasma and third ventricle tumours, and in study of the contours of the third ventricle and of pressure effects of the third ventricle upon the sella and chiasma.[1]

Dr. B. G. ZIEDSES DES PLANTES (Utrecht) described "planigraphy" and "subtraction," two new radiographic methods applied in neuro-roentgenology. Planigraphy yielded an isolated image of a certain plane of the object, whilst subtraction gave an isolated image of that which at one moment does, and at another moment does not, belong to the image-forming object, for example, a contrast liquid.

THE AUTONOMIC NERVOUS SYSTEM

Dr. A. VAN BOGAERT (Antwerp) reported an experimental study of centres regulating the blood pressure in the floor of the third ventricle. He described the effect of faradic excitation in this region. It was possible to evoke a considerable rise in arterial blood pressure in the excitation of which the suprarenals played a part. At the same time the heart-rate increased at first, but later become slow. These experiments afforded evidence for the existence in the floor of the third ventricle of pressor and inhibitor centres of the cardiovascular system.

Prof. C. H. FRAZIER and Drs. BERNARD ALPERS and F. H. LEVY (Philadelphia) read a paper on the hypothalamus and temperature regulation. The occurrence of hyperthermia in patients in whom suprasellar cysts had been removed at operation and who died within 48 hours showed that the areas affected are chiefly the substantia grisea of the third ventricle and small portions of the mesial part of the nucleus tubero-mammillaris.

Mr. G. C. KNIGHT (London) speaking on the nervous control of the œsophagus, said that experiment had shown that there was a true intrinsic sphincter at the cardia, which received its sympathetic supply in part at least from the cœliac plexus. Bilateral vagal section produced the X ray appearances and symptoms of achalasia of the cardia. If, however, the sympathetic supply to the cardiac sphincter had been severed, no obstruction at the cardia was caused by vagal section. Experimental achalasia could be relieved by sympathectomy.

Prof. L. ASHER (Berne) read a report on the mode of action of the sympathetic and its integrative function. An investigation of the influence of the sympathetic on muscle showed that excitation of these nerves produced restoration after fatigue. The sympathetic impulses acted on the muscle itself and shortened the time necessary for restoration. The resynthesis of phosphagen was increased on the side of the sympathetic stimulation.

DISSEMINATED SCLEROSIS

Dr. TRACY J. PUTNAM (Boston) read a paper on the pathogenesis of multiple sclerosis. Both multiple

[1] Twining, E. W., and Rowbotham, G. F.: THE LANCET, July 20th, 1935, p. 122.

sclerosis and acute disseminated encephalomyelitis had been simulated in animals by the use of minute doses of tetanus toxin and more recently by obstruction of cerebral venules. Thrombi and obstructed vessels might be found in the lesions of multiple sclerosis, encephalomyelitis and diffuses clerosis. It was suggested that infectious or other exogenous factors might activate the clotting mechanism to an abnormal degree, causing thrombosis chiefly of cerebral venules and then plaques of demyelination and gliosis.

Dr. R. M. BRICKNER (New York) described the blood esterase changes associated with remission in multiple sclerosis. The serum esterase had been studied during remissions in this disease. The esterase values were not distinctive for multiple sclerosis as such, but it was found that during the active phases of the disease the values were low and during the inactive phases high.

Dr. ARTHUR WEIL (Chicago) discussed the demonstration of endogenous myelolytic (myelin-splitting) substances in nervous diseases. A total of 460 urines was examined for the presence of myelolytic substances. These were absent in 30 normal controls, but present in 59 out of 89 patients with disseminated sclerosis and in 13 out of 16 patients with post-encephalitic parkinsonism.

ACUTE ENCEPHALOMYELITIS

Dr. E. HERMAN (Warsaw) discussed clinical considerations in epidemic disseminated encephalomyelitis, on a basis of 100 cases observed in Poland between 1927 and 1935. A variety of forms of the disease were described according to whether its main incidence lay upon the meninges, nerve roots, peripheral nerves, sympathetic nervous system, spinal cord, medulla, cerebral hemispheres, or psychical functions. In spite of some resemblance both to encephalitis lethargica and to disseminated sclerosis Dr. Herman regards it as a distinct nosological and epidemiological entity.

Prof. A. AUSTREGESILO (Rio de Janeiro) spoke on acute and subacute epidemic neuromyelitis observed in Brazil. Five principal varieties, he said, had been observed: a form with a polyneuritic onset followed by remission and later aggravation; a form characterised by acute neuromyelitis, with fever and symptoms of meningoencephalitis; a severe and fatal form of Landry's paralysis; a severe but completely recoverable form of Landry's paralysis; and a form of acute neuromyelitis of the Landry type but terminating in myelitis. It was believed that a new virus was responsible for the malady.

THE SURGICAL TREATMENT OF HYPERTENSION

Prof. MAX M. PEET (Ann Arbor, Michigan) reported the results of operations upon 60 patients with hypertension. The surgical procedure consisted of bilateral resection of the greater and lesser splanchnic nerves and of the lower dorsal sympathetic chain, usually including the 10th, 11th, and 12th dorsal ganglia. The blood pressure of all patients operated upon was over 200 mm. of mercury, and many showed retinal hæmorrhages and exudation with papillœdema. Some degree of improvement was seen in 85 per cent., and in 15 per cent. this amounted to apparent cure; 10 per cent. were not benefited. In some cases the blood pressure, previously as high as 285 mm. of mercury, remained at 130 or 140 over periods ranging from six to seventeen months. Papillœdema, retinal hæmorrhages and exudate disappeared and there was a complete return to normal vision and renal function.

Prof. ADSON (Mayo Clinic) described the results obtained in 32 cases. He had found that bilateral ventral rhizotomy through a laminectomy wound from the 6th thoracic to the 2nd lumbar roots inclusive was more effective than bilateral resection of the splanchnic nerves. The mean drop in systolic pressure after extensive rhizotomy was 44 mm. of mercury and the mean drop in diastolic pressure was 38 mm. The patients who responded best to this treatment were those whose symptoms of hypertension were progressive but whose disease had not done irreparable damage to the heart, kidneys, or retinal and cerebral vessels.

Prof. Pavlov's Address

Prof. I. P. PAVLOV, speaking in German, read before a crowded audience a paper on "the types of higher nervous activity, their relation with the neuroses and psychoses, and the physiological mechanism of neurotic and psychotic symptoms." On the basis of his experiments on conditioned reflexes, Prof. Pavlov said it was possible to distinguish four types of dog. According to the strength of the excitation processes the dogs could be divided into two groups, the weak and the strong. The strong could be further subdivided according to the relationship between their excitation and inhibition processes into the balanced and the unbalanced, and finally the strong balanced type could be divided according to the liveliness and lability of the nerve processes into the slow and the quick. Thus the four types were, the strong unbridled, the strong balanced and slow, the strong balanced and quick, and the weak. These corresponded to the four Greek temperaments, the choleric, the phlegmatic, the sanguine, and the melancholic. In order to explain the normal and the pathological conduct of man it was necessary to add to these types which were common to man and animal, special human types, the artistic, the thinking, and an intermediate type. Under experimental conditions neuroses arose readily in the excitable, unbridled, and in the weak type of dog. The former lost almost entirely the capacity for inhibition: in the latter the higher nervous activity either failed entirely or remained in a chaotic state. Kretschmer, who limited himself to two general types, the unbridled and the weak, appeared to relate the former type with manic-depressive psychosis and the latter with schizophrenia.

Prof. Pavlov considered that constitutional neurasthenia was the characteristic disorder of the general weak or unbridled type and of the intermediate human type. Hysteria is the product of the general weak combined with the artistic type, and Janet's psychasthenia the product of the combination of the general weak with the thinking type. Weakness of the excitation processes led to predominance of the inhibition processes in the form of sleep and hypnotic conditions, and a similar explanation was offered for narcolepsy, cataplexy, catalepsy, and catatonia.

Hughlings Jackson Lecture

The Hughlings Jackson lecture, entitled The Motor Cortex in Man in the Light of Hughlings Jackson's Doctrines, was delivered by Prof. OTFRID FOERSTER, of Breslau, at a special meeting of the neurological section of the Royal Society of Medicine before an audience drawn from neurologists of all nations assembled in London for the Second International Congress of Neurology.

Dr. S. A. KINNIER WILSON, president of the section, after recalling the distinguished neurologists who had previously delivered the Hughlings Jackson lecture, explained that the lecture had been arranged to

coincide with the meeting of the Congress as a fitting celebration of the centenary of Hughlings Jackson's birth.

Prof. FOERSTER expressed his appreciation of the honour conferred upon him in being asked to deliver the lecture in the year of Hughlings Jackson's centenary, and of the opportunity it afforded him of paying a tribute to Hughlings Jackson in the place where he had carried out the work which constituted "monumentum aere perennius."

Jackson was the first to point out the existence of a motor cortex, his recognition of which was based upon the experiments on the human brain conducted by disease. He recognised that epileptic convulsions were a caricature of movements and from this he derived the revolutionary view that the cortical motor cells must be concerned with movement. Jackson's localisation of foci in the motor cortex, based upon clinical observation, alone remained unchanged to-day. Prof. Foerster discussed the significance of the bilateral representation of certain movements in the motor cortex and said that in the case of these movements bilateral effects could still be obtained from electrical excitation of the motor cortex after division of the corpus callosum. Movements were not represented in the motor cortex in sharply delimited areas. Repeated electrical stimulation of a single area might be followed by movements of different though closely associated limb segments. The motor cortex, in fact, was not a mosaic like a cubist picture but more closely resembled the soft and merging colours of a Raphael Madonna.

As a result of the localisation of motor functions in the motor cortex localised lesions in this region produced focal palsies, examples of which were given. The precentral convolution had been subdivided by Brodmann into two areas, area 4 and area 6 aα on the basis of differences in the size of the ganglion cells. An English neurologist had recently expressed the opinion that this anatomical difference was not correlated with any difference of function, a view which would not have been acceptable to Hughlings Jackson and was in conflict with the fundamental work of the Vogts and Fulton. Electrical stimulation confirmed the difference of function between these two areas and there was evidence that the motor effects of area 6 aα were mediated through area 4, for after excision of area 4 area 6 aα was no longer excitable.

In Jackson's view no cortical area was purely motor and none was purely sensory. Though the postcentral convolution was an important sensory area, when stimulated electrically it yielded the same movements as the precentral convolution, though the threshold was higher. The aura of a convulsion originating in the postcentral convolution was a sensory disturbance.

Prof. Foerster described the features of the convulsions excited by stimulation of other regions of the cerebral cortex. Severe vertigo occurred as a manifestation of an irritative lesion of the interparietal sulcus. From motor areas other than the precentral convolution complex postures and movements could be excited. Such excitable areas utilised extrapyramidal paths and were the means by which were mediated the clumsy synergic movements of the whole limb which remained after destruction of the pyramidal tract. After such a lesion improvement in skilled movements might occur through the compensating function of the undamaged ipsilateral motor cortex, but such compensation was never complete. After excision of an area of extrapyramidal motor cortex, motor symptoms were absent or transitory. The isolated destruction of area 4 or of area 6 aα, the results of which had been so carefully analysed by Fulton in the primates, was very rare in man.

There was scarcely a single neurological problem which had not been illuminated by Hughlings Jackson's ingenuity. It had been said that, except the blind forces of nature, nothing moved in this world which was not Greek in origin, and it was true to say that nothing moved in neurology which was not in origin Jacksonian.

After Dr. KINNIER WILSON had presented Prof. Foerster with the Hughlings Jackson medal, Prof. VIGGO CHRISTIANSEN, Prof. G. MARINESCO (in absentia), Prof. MAX NONNE, and Prof. PAVLOV were admitted as honorary members of the neurological section of the Royal Society of Medicine.

Social Functions

His Majesty's Government gave a reception to members of the Congress at Lancaster House on Monday, July 29th, when the members were received by Sir Kingsley Wood, Minister of Health, and Lady Wood. On Tuesday receptions were held at the Royal Colleges of Physicians and Surgeons, where members were received by the presidents, Lord Dawson of Penn and Sir Cuthbert Wallace. On Thursday the official banquet of the Congress was held at the Grosvenor Hotel. Dr. Gordon Holmes presided and the toast of the International Congress was proposed by Lord Dawson and responded to by Prof. Kroll on behalf of Prof. Pavlov, Dr. Bernard Sachs, Prof. Claude, Prof. Nonne, and Prof. Christiansen. The toast of the officials was proposed by Prof. Monrad-Krohn and responded to by Dr. Kinnier Wilson. On Friday a reception was held at the Royal Society of Medicine, the guests being received by the immediate past-president, Mr. Warren Low. A cinema entertainment was given. The beautiful weather added much to the pleasure of the meeting and especially the excursions to Oxford, Cambridge, and other places of interest in and around London.

The arrangements for the Congress were in the hands of Dr. Gordon Holmes, president; Dr. S. A. Kinnier Wilson, secretary-general; Dr. Anthony Feiling, treasurer; and Dr. Macdonald Critchley and Dr. E. A. Carmichael, assistant secretaries. Mrs. Wilfred Harris was chairman of the ladies' committee, of which Mrs. Gordon Holmes and Mrs. Kinnier Wilson were secretaries.

PARIS

(FROM OUR OWN CORRESPONDENT)

TYPHOID FEVER AND SHELL-FISH

WITH the notification of typhoid fever little more than a pious ideal, it is notoriously difficult to obtain reliable figures about the morbidity from this disease in France. Mortality returns are nearer the truth, witness the paradox that in certain areas the death-rate exceeds the sickness-rate from the enteric fevers. Since 1925 the *Bulletin de la Statistique Générale de la France* has been publishing mortality returns of which Dr. G. Dubreuil has recently made good use. His main points are that the enteric fevers are more common in seaboard than in inland areas, that the *fruits de la mer*—i.e., shell-fish and the like—are out and away their most serious cause,

and that the comparatively small communities living on the sale of these fruits are at present disregarding public health measures at the expense of vast numbers of consumers These pay with their lives for the immunity enjoyed by a minority to poison them. As Dr. Dubreuil caustically remarks: "It seems to me that those who speak in favour of the living producers might be confronted with the representatives of the dead consumers. For though the latter no longer vote, they have at least a consultative voice." Dr. Dubreuil's figures deal with the seven-year period 1925–1931, and show that the average annual death-rate from typhoid and paratyphoid fever throughout France was 4·8 per 100,000 inhabitants; the department of Bouches-du-Rhône heads the list with 16·2 deaths per 100,000. Of the 23 departments with a typhoid mortality above the average, only 7 were inland departments; whereas of the 67 departments enjoying a typhoid mortality below the average, only 9 were seaboard departments. Of the 66 inland departments, as many as 57 had a typhoid mortality below the average. In his study of the four principal zones of endemic typhoid fever, Dr. Dubreuil gives due credit to defective drainage and water-supplies, milk and its products, and raw fruits and vegetables as causes of the enteric diseases; but he comes back to the *fruits de la mer* as the crux of the problem.

PIRQUET TESTING OF RECRUITS

There is this to be said against Pirquet surveys of students, hospital patients, and other more or less isolated units, that the findings are applicable only to a limited class. A conscript army, on the other hand, with its deliberate disregard of social and economic strata of society, offers opportunities for investigations whose conclusions hold good for the entire population at a certain age. A recent Pirquet survey has been presented by Dr. J. Troisier, Dr. M. Bariéty, and Dr. P. Nico to the Academy of Medicine (Bull., 1935, cxiv., 54); their material consisted of infantry recruits, aged 20 and 21, combed out from all the social classes of northern and eastern France. Some came from the country, others from large towns. In as great a proportion as 25 per cent. the reaction was definitely negative, and only in 60·6 per cent. was the reaction definitely positive. These findings, confirmed in many other countries, suggest that the teaching of yesterday, that nearly every member of a civilised community is Pirquet-positive before adult life is reached, is incorrect or out of date. If it is incorrect, then we have been misled into applying to the world at large the findings of tuberculin surveys in hospital and urban milieux in such towns as Vienna. If, however, this teaching is out of date, and what was true a score of years ago is no longer true to-day, then we seem to be approaching a time when, with many if not most of our young adults tuberculin-negative, we must think of them in terms of susceptible natives hailing from distant shores whose soil is virgin. As the military investigations just quoted show, the percentage of negative reactors is much higher among young rural than young urban members of the community; and now that the pendulum is swinging in favour of regarding the young tuberculin-positive adult as more tuberculosis-resistant than the young tuberculin-negative adult, the centre of gravity of the problem is shifting from the town to the country. If something has to be done for the rural aspirant to army or city life, the thoughts of Frenchmen to-day naturally turn to B C G inoculation of the tuberculin-negative.

THE EXAMPLE OF BREST

And recent experience at a naval port points in the same direction. The port of Brest is one of the black spots on the tuberculosis map of France. Officially, and during the past ten years, the annual death-rate there from tuberculosis has been 5·3 per 1000. More than every fourth death is officially traced to tuberculosis. But with the official notification of tuberculosis as a cause of death notoriously incomplete, these figures are an under-estimate. More instructive is the observation that, for the whole of France, the tuberculosis death-rate is about 1·6 per 1000 annually, or less than one-third that of Brest. Faced by this serious state of affairs, Dr. J. Quérangal des Essart, chief medical officer of the 2nd Arrondissement Maritime of Brest, has, since 1926, sought to reduce the morbidity and mortality from tuberculosis by systematic B C G vaccination of infants and tuberculin-negative children and young adults, and in coöperation with Mme G. de Carbonnières de Saint-Brice he has now published (Rev. de la Tuberc., June, 1935) studies of 823 families with a total of 2277 children, 1193 of whom were given B C G by the mouth at birth in three doses, while the others served as controls. Other children were given B C G by subcutaneous injection. The presentation of their results leaves much to be desired, but it seems pretty clear that the mortality among the controls was much higher than among the children who had B C G.

DEATH OF A CENTENARIAN

The death on July 16th of Prof. Alexandre Guéniot has shocked Paris into realising that even centenarians are mortal. Ever since November, 1932, when he celebrated his 100th birthday, his alert and cheerful personality had captured the imagination of his compatriots who had come to regard him as the personification of the most vital qualities of the typical Frenchman. A much interviewed man, he was generous in parting with the secrets of his long life. They were simple enough in all conscience. No asceticism but moderation, moderation in all things. Caution also was one of his watchwords. Before you cross a road, look to right and left and then to left and right. He applied this advice to his own conduct both metaphorically and literally. His career was distinguished. In 1863 he was appointed to an obstetrical hospital in Paris, and in 1869 the title of professor was conferred on him. He was president of several important societies including the Obstetrical Association and the Academy of Medicine. Most of his publications from 1860 onwards dealt with gynæcological subjects.

TOLL OF THE ROADS

Dr. Béhague has described the organisation of first aid on the French highways—a system for whose creation he is largely responsible; there are now more than 2000 first-aid posts on the highways, and they treat an imposing number of casualties. There are, according to Dr. Béhague, three particularly dangerous hours. Between 11 and 12 road accidents are common because the meal ahead makes the driver accelerate. Between 3 and 4 he is again liable to accidents because the meal to which he has hurried has rendered him drowsy and, if alcoholic, it has also impaired his judgment. There is a third accident peak at 6, when workers leave the factory and scurry off on bicycles on which they collide with motor-cars. But the motor-bicycle is the supreme generator of road tragedies. Absolutely the number of road accidents continues to show an

upward curve, but relative to the number of vehicles there has been a progressive decline since 1932, the happy result of a combination of factors—better roads, better cars, better signals, and better drivers, for 35–40 per cent. of those who would like to drive are eliminated by failure to satisfy the examiners for licences. Dr. Béhague lays great stress on the educational measures designed to create a healthy fear of motor vehicles in the minds of the younger generation; he notes that dogs and chickens are less vulnerable than they used to be, having educated themselves. But how he does not explain.

BUCHAREST

(FROM OUR OWN CORRESPONDENT)

AN ACADEMY OF MEDICAL SCIENCES

A LONG-FELT want is met by the establishment of the new Rumanian Academy of Medical Sciences, whose object is the furtherance of medical, veterinary, and pharmaceutical knowledge. For the time being it will have only 32 members, nominated by the medical, veterinary, and pharmaceutical faculties of the universities. The Bucharest medical faculty is represented by Profs. Anghelescu, Balacescu, Danielopolu, Marinescu, Parhon, Proca, and Rainer. At the first meeting, held on July 1st, the members elected Prof. Anghelescu, the present minister of education, as their president, and Marinescu their vice-president. Meetings will be held twice monthly in Bucharest, and from the beginning of next year the Academy will publish a periodical of its own with the title *Buletinul Academiei*. At the meeting on July 15th six honorary members were appointed on the recommendation of a committee, which was asked to submit the names of six illustrious foreign professors who have some connexion with the advance of Rumanian medical sciences. They are Profs. Charles Achard, Henri Vaquez, Emile Sergent, Henri Hartmann, Jean-Louis Faure, and Gustave Roussy. The Academy is to be formally opened, in the presence of many foreign medical celebrities, on Nov. 1st.

PROF. MARINESCU RETIRES

The doyen of Rumanian neurology, the greatest living Rumanian medical scientist, Prof. Marinescu, is to retire on reaching the age limit. His successor will be Dr. Paulian, director of the Central Neurological and Psychiatric Hospital. Paulian is a pioneer of modern neurology and has just returned from lecturing in France, where he has been received with sympathy and approbation. He will be a great gain to the medical faculty, for he is an indefatigable worker in what bears on the social aspect of medicine.

RACIAL PRIVILEGES

In the past academic year there have been frequent disturbances, very often with anti-Semitic tendency, especially in the medical faculty of Bucharest University. So serious did things become that the university board had to fall back on closing the gates of the faculty a month before the Easter holidays. Seeing that this measure did not put an end to the excesses, the board called a conference with the object of making drastic decrees for the restoration of order. This conference strongly condemned the attitude of the students and resolved to deal with them firmly in the future. At the same time it acknowledged, in principle, that limitation of the number of medical students would not be out of place. Selection is necessary, though not on religious or racial grounds, and a committee has been appointed to arrange for examinations to be passed before matriculation. Meanwhile there is a widespread movement, started by M. Vaida-Voevod, the late Prime Minister, which demands the protection of the racially Rumanian elements by securing them an 80 per cent. representation in industry, in trade, and also in the so-called free occupations, such as medicine and the law. Thanks to the sane outlook of the present government, Vaida has failed to gain enough adherents to bring his policy into effect, but it has nevertheless stirred up feeling, and even local medical societies have urged that 80 per cent. of State and official positions shall be held by ethnical Rumanians. In these circumstances Prof. Ghiulea of Cluj University, a renowned sociologist, has pointed out that according to the laws at present in force it is not permissible for the universities as a whole to limit enrolment: only the single faculties have the right to fix the number of students. On the other hand, he says, nobody has a right to forbid a citizen from taking his share of education, and from this point of view the suggested limitation is directed against the universal human culture—a proposal the less understandable, because no serious ground for the limitation or reduction of the number of students can be found. At the University of Cluj the number of the Rumanian elements dwindles from year to year, in comparison with the minorities. This phenomenon is not attributable to the increase of the number of minority students but to the pauperisation of the Rumanian elements. The government, in Prof. Ghiulea's opinion, has not solved the problem by excluding the minorities from the high-school education under the "numerus clausus" (as it is called here), which means that the minorities can enrol to the high schools only in the proportion of their census numbers to the general population. The minorities go away to foreign universities and return with first-class qualifications. The "numerus clausus" cannot be a serious solution; results can be attained in this sphere only by complete liberation of education, coupled with support for the Rumanian elements. We have no right to close the gates of the universities to the minorities, concluded Prof. Ghiulea, and thereby exclude them from the boons of culture. The country needs enlightened men and not half-cultivated or uncultivated ones.

COMPULSORY MEDICAL WORK IN THE COUNTRY

Hitherto the supply of doctors to the Bulgarian rural population has been very insufficient. Three-quarters of the physicians live in towns and cities, while three-quarters of the population live in villages. Outside the towns life is so primitive that a man with university education, be he ever so little pretentious, can only put up with it at great self-sacrifice. The Bulgarian government is trying to remedy the present state of affairs—in which there is only one doctor for every 8000 people in the country—by a modification of the public health laws. The new law, which has been recently sanctioned, prescribes two years' compulsory medical service in villages. Any duly qualified physician, who after his graduation has spent a year either at a clinic or in a State hospital, is entitled to carry on practice in a village, and none is allowed to settle in a town unless he can produce a certificate of having spent two years in a village. The board of public health has compiled a list of all the better-class villages where rural practice can be carried on. The villages in their turn are obliged to supply the doctors with adequate houses, while the State pays them 2000 levas monthly. Where the

doctor will be called to outside areas he has to be provided with a suitable car. The physicians are obliged to treat poor patients free, but only in their surgeries. The outside fees fixed by the government are quite acceptable: thus a visit to the patient's house is reckoned at 4 shillings, and an intravenous injection at 2 shillings.

MEDICINE AND THE LAW

Damages for Shortened Life

If a man is injured by somebody's negligence and dies of the injury, certain claims for damages which formerly died with him will nowadays survive for the benefit of his estate. This is due to the Law Reform (Miscellaneous Provisions) Act, passed last year. If the injured man lived, he would be able to recover damages for the pain and suffering inflicted by the accident and for the diminution of his normal expectation of life. Under the new law these two claims survive after his death, but an important decision last week (in Slater *v.* Spreag) shows how the new law may be restricted. Mr. Slater was a chimney sweep and gardener, earning £5 a week on the average. Cycling on the Great North Road, he was struck by the defendant's motor-car; his skull was fractured and he died two days later. At the trial the defendant admitted negligence and the case was fought on the issue of damages. Even under the former law Mr. Slater's widow (who was also his administratrix) could have recovered certain limited sums. Under the new law she asked for additional damages for the pain and suffering caused to her husband by the accident and for the diminished expectation of his life. He was 44 years old and in excellent health previously. But he had been unconscious from the moment of his accident until he died. It could not be proved that he had suffered pain; so here was an element of damages which did not exist for him and could not survive for the benefit of his estate and his widow. For the same reason his shortened expectation of life gave his estate nothing to sue upon. In Mr. Justice MacKinnon's view the new law here takes into account only the subjective effect on the injured man, the mental effect upon him of his knowing that his life was cut short. If Mr. Slater never regained consciousness, he never knew of his diminished expectation. There never existed for him on this ground any mental distress which at his death could be cashed for the benefit of his estate. In an easily imaginable case, where an injured man lives on for six months in pain and sees his death approaching him untimely, his right of damages in these respects can survive his death; in Mr. Slater's case there was no claim which could survive. The widow, however, obtained damages on other grounds available under the old law.

Thus the new Act is being gradually elucidated. It has been argued with force that damages are compensation to be paid to a man for injuries suffered by him and that it is impossible to assess the damages to be awarded to one man for injuries sustained by another. How, it is asked, can a man's estate reasonably be compensated if he suffers pain before death? If, to quote the familiar argument usually advanced in these cases, a man bequeaths his estate to the British Museum, how can the institution be compensated for the sufferings which caused his death? The more his life is shortened, the better for the institution. What passes to the executors is not an accrued claim for damages, but merely a right of action; damages cannot be assessed after a man's death on the assumption that he is still alive. Be these metaphysical speculations as they may, Parliament passed the new law and the judges have to make the best of it they can. This was the first time the point has been taken in the London courts. In one case at assizes, Mr. Justice Humphreys has awarded an executor damages for the pain and suffering of the deceased; in another case at assizes Mr. Justice Macnaghten refused to do so. Earlier this year (in Flint *v.* Lovell) the Court of Appeal held that damages at common law, awarded to a man still living, might include a sum for the shortened expectation of life caused by the defendant's negligence. But critics insist that the doctrine of damages for shortened expectation of life cannot reasonably be applied to cases where life has already been shortened by death.

Hearsay Evidence at Inquest

At an inquest last week counsel, appearing for one of the parties possibly concerned, made a protest against the admission of hearsay evidence and even (according to newspaper reports of the case) threatened the coroner with a prerogative writ of some kind for the latitude with which the witnesses were treated. Barristers, accustomed to the strict rules of evidence observed in the regular courts of civil and criminal jurisdiction, naturally and properly take points in the interests of their clients at coroner's inquests; but it is hardly necessary now to say that a coroner is fettered by no rigid rules of evidence. He is bound, as Mr. Justice Wills explained in 1890 when charging the grand jury in a murder case at Chester assizes, to collect as far as he can all information and knowledge of disasters from neighbours and others who can throw any light upon the cause of death; he can often collect facts and statements, which, whether or not they can ultimately be turned into evidence against persons to be put upon their trial, are valuable "as supplying material for investigation by the police and as affording clues which may lead to successful inquiry." If, said Mr. Justice Wills, the coroner rejected evidence on the supposition that he was in the same position as a judge trying a prisoner, he would throw away a good deal of the remaining usefulness of the institution of the inquest. The committee which is at present considering the possible revision of the law and practice of coroners is hardly likely to overlook this aspect.

Two further considerations are not to be forgotten. First, strict rules of evidence largely depend on relevance. A definite person is accused of a definite offence on a definite date; thereupon the witnesses are directed to the proper end as it were along tramlines. At an inquest all is vague; it may be uncertain whether any offence has been committed and whether any specific person was concerned; hence, instead of moving along direct lines to a well-defined object, inquiry roves tentatively in all directions. It is the function of the coroner to range widely, though, where any person is incriminated before him on evidence which is strictly irregular, he will usually advise the jury to dismiss from their minds the inadmissible testimony before committing anyone for trial. In the second place the barrister, who seeks to impose on all tribunals the highly technical rules of procedure in which he has been trained, has no right to take part in an inquest or to put questions or make speeches save by permission of the coroner. Here again there is no analogy between a coroner's court and an ordinary criminal trial, though here again the coroner exercises a discretion which usually satisfies the Bar.

THE THIRD EUROPEAN REUNION OF MENTAL HYGIENE

THIS congress took place at Brussels on July 20th and 21st, under the auspices of the Belgian National Council for Mental Hygiene. The president was Dr. Ernest de Craene, and the general secretary Prof. G. Vermeylen, both of the University of Brussels.

The meetings were well attended and included representatives from Australia, Canada, U.S.A., France, Finland, Holland, Italy, Switzerland, Esthonia, Belgium and Great Britain. The British Government were represented by Sir Laurence Brock, C.B.E., chairman, and Sir Hubert Bond, senior commissioner of the Board of Control. The National Council for Mental Hygiene for Great Britain was represented by Dr. H. Crichton-Miller, Dr. J. R. Rees, and Dr. Doris Odlum. Other British members present were Dr. E. A. Bennett (London), Dr. Mary Luff (London), and Dr. Hemingway Rees (London).

BOARDING-OUT OF MENTAL PATIENTS

In opening the discussion on the first subject, the boarding-out of mental patients in families other than their own, Prof. G. CORBERI (Milan) said that this method had only been used in Italy since 1900. The chief reason for its trial had been the necessity of relieving the mental hospitals which were aiming at separating the treatment of those patients suffering from acute and chronic forms of mental illness. In Italy, the foster-families were mostly peasants living in the neighbourhood of a hospital. Since the war there had been a gradual reduction in the numbers boarded out, which was attributable to the recognition of the value of occupation therapy carried out under direct medical control. At Imola, a new system had developed on the ruins of the old. It consisted of the formation of little colonies of patients in the care of peasant families, both colonies and families working under the control of an organisation which dealt with all the needs of the patients, and was responsible for paying the foster-families. At the present time about 10 per cent. of the mental patients from the provincial hospital of Imola were cared for in this way, the cost being halved. He was convinced that this method of treatment was capable of considerable extension.

Dr. SANO (Gheel) said that Gheel was in the peculiar position of having centuries of tradition in the boarding-out and treatment of mental patients. There was a small central hospital to which patients could be sent if they proved unsuitable for family care, and should this condition persist, they would be transferred to one of the State mental hospitals. The difficulty of finding suitable and willing foster-families was one of the greatest drawbacks in places which had not the traditions of Gheel.

Dr. J. VIÉ (France) spoke of the conditions at the colony of Ainay-le-Château, and discussed the type of mental illness most suitable for care in a colony of the type of Gheel. The medical indications for such treatment depended very largely upon the type of family that would receive patients. Its true function, he said, was a form of social psychotherapy—a readaptation to the life of a household, without emotional stresses, and of a simple character associated with the curative effects of occupation. He thought that, as at Gheel, patients of varying social classes should be part of the system.

In the course of discussion, Sir LAURENCE BROCK said that the experiment of boarding-out the more chronic case, in order to relieve the pressure on the mental hospital, and also to afford the patients themselves some measure of normal home life, was now being attempted in England and Wales. Up to the present, the difficulties had been, primarily, in finding suitable homes. Very few people were willing to take such patients, except those living in rural areas, notably in Suffolk and Wiltshire, and in very poor circumstances. In addition to the difficulty of finding suitable homes, there was the question of keeping the male patients out of public houses. He himself was convinced of the value of this system to the patients, but it was not likely to provide any appreciable saving in the expense of maintenance. If the system were extended to the recoverable case, it might well accelerate their restoration to health in suitable cases.

Prof. CORBERI, in summing up, pointed out that at Gheel acute cases were frequently boarded-out, often without any preliminary hospital treatment. He favoured the procedure of treating the acute case in hospitals and only the chronic case placed in a family.

PUNISHMENTS AND RESTRICTIONS

With Sir Hubert Bond in the chair, Dr. H. MENG (Basle) opened the discussion on the psychological value and dangers of punishment and restrictions in the upbringing of the child. He spoke from the psychoanalytic angle, basing the use of punishment and restrictions on a fundamental desire for the control of others which exists in every human being. He held that all punishments and restrictions should aim at bringing the aggressive tendencies of the child under the control of a strong ego. Perhaps one of the most valuable contributions of psycho-analysis to public health lay in its revelation of the true emotional interactions between parents and children. All educational methods should be examined from the point of view of their present and future effectiveness in controlling the aggressive and sexual instincts of the child, so that he might become a productive and coöperative member of the community.

Dr. H. CRICHTON-MILLER stressed the importance of the family and the school as the essential agents of social adaptation. Personal discipline and active social coöperation were the final aim of all educational systems. Dr. Crichton-Miller agreed that the adult desire for vengeance as a basis of the infliction of punishment and restrictions was worthy of investigation, but he did not feel that it was the fundamental problem. Punishment, in his view, had been employed in every stage of society in order to control the child's tendencies to aggression and disobedience, and to combat his destructive instincts. The basic duty of the adult was to adapt the child to life with a minimum of suffering, on a basis of establishing emotional conditioned reflexes. The stress on the vengeance aspect of punishment he regarded as a characteristic error of the Freudian school of thought. In the process of adaptation to life, it was desirable that the child should be surrounded by controlling forces, which in their impersonality and inexorability should appear to him to approach as closely as possible to the laws of nature. The adult who used his desire for power tended to be arbitrary and autocratic, and therefore to destroy the child's sense of emotional security. It was essential that the child should be able to foresee what the emotional attitude of parents or teachers would be to its behaviour, otherwise it would develop a sense of anxiety, discouragement and insecurity. Even the bitter resentment that an

over strict régime would provoke, was less damaging than such a feeling of insecurity. Many people condemned all punishments, saying that they believed in controlling by love. The great danger of this attitude was the development of a personal attachment, which was hostile to real freedom. The ideal formula for the child should be "I shall do this in order that I may become a man and independent; if I do not do this, I shall suffer from the opposition of society." The too-strict father replaced it by this formula: "I shall do this to avoid punishment," and the mother, who traded on the child's affection for her, substituted the formula: "I shall do this, or mother will not love me." Of these, the last was obviously the most dangerous; in both cases the child would not develop his personality, but would be influenced rather by the desire to escape discomfort. Though punishments and restrictions had a certain value in the early stages of education they could not in themselves produce a positive attitude of mind, which should be the aim of all education.

In the course of discussion, Sir LAURENCE BROCK spoke as the father of a family, who believed that the ordinary normal child was all the better for a certain amount of punishment and restriction, provided that these were justly administered.—Dr. ODLUM agreed with Dr. Crichton-Miller that nothing was worse for a child than to feel emotionally insecure. Children were, so to speak, emotional barometers where the adults around them were concerned.—Dr. O. L. FOREL (Geneva) agreed that a discipline founded on the desire to render the child an independent personality was the ideal of all education. The actual method was of less importance than the spirit which actuated it.

MENTAL HYGIENE AND THE PRESS

Dr. FOREL spoke of the importance of the Press in influencing the psychology of the people. He was particularly opposed to the publication of reports of suicides, and to advertisements of certain types of drug. Law reports of unsavoury cases and obscene pictures were calculated to undermine public morality. He considered that it would be valuable if each paper could have attached to it a critic competent to assess the mental hygiene value of news.—Dr. J. VAN DER SPEK (Holland) emphasised the suggestibility of the public. Even the more highly educated were greatly influenced by the attitude of their favourite publication. The Press was one of the greatest forces in the world for good or evil.

At the conclusion of the congress the Belgian Council for Mental Hygiene were thanked for their kindness and hospitality. On behalf of the National Council of Mental Hygiene of Great Britain, Sir Laurence Brock and Dr. Odlum invited the members to hold the fourth European reunion in London, in July, 1937.

PUBLIC HEALTH

Food

THE war taught the peoples of Europe that the organisation of national food-supplies was possible. The depression has sharpened their interest in nutrition. Remembering the anxieties of war-time they have expected manifestations of under-nourishment among the families of the unemployed, or the partially employed, and have planned to prevent underfeeding especially of the children. As the result of mass experiments and surveys more is known about the state of nutrition of communities all over the world than ever before, and the effect of supplementation of diets or deprivation of certain food constituents has been widely studied. The remarkable fact has been established beyond question that, in a period of almost unprecedented world depression, the physique of the children of the poor is improving. It is difficult to attribute the phenomenon to anything but intelligent application of the rapidly increasing knowledge scientifically acquired as to foods and feeding, together with a humane attitude toward questions of financial assistance of the poor. Interest in the subject, in spite of the demonstrable improvement, shows no sign of abatement. Indeed, from the feeling that little new remains to be done about the prevention of communicable disease in temperate lands—unless methods of immunisation are simplified and perfected and welcomed by the public—health departments are becoming more physiological and less pathological in their outlook. It seems clear that the promotion of physical and mental fitness, which was the object of the establishment of school medical and maternity and child welfare services some thirty years ago, must absorb the attention of medical officers in public health departments to an increasing extent, and nutrition is at the root of these problems.

A WORLD SURVEY

Recently we drew attention to a summary of present-day knowledge on foods and nutrition prepared in the Health Department of Glasgow.[1] There now comes to hand a broader survey of the subject, prepared by Et. Burnet and W. R. Aykroyd at the instance of the Health Organisation of the League of Nations,[2] addressed to public health authorities. The writers modestly refer to the superficialities of their survey, but from a practical point of view it is exhaustive. It occupies 150 pages of the bulletin and deals with the place of nutrition in public health programmes, the relation of national economics to physiology, the evolution of diets and dietary habits among different races, our present knowledge of nutrition, dietary and nutritional standards, problems of production and distribution of food, and educational principles and methods in relation to nutrition. References to 129 original articles are given. Of special interest is the emphasis laid on the international problem exhibited by insufficient or defective feeding in some countries while others are suppressing production or actually destroying food; and the preoccupation of governments with economic issues regardless of their public health repercussion. Economic nationalism and public health internationalism are, in the writers' view, incompatible. Special attention is also devoted to the diets of rural communities.

THE FARMER'S DIET

A recent inquiry[3] in Wales by Mr. J. P. Howell, M.Sc., into the economics of farming and its effect on the dietary of farmers' families deserves notice. From this limited investigation it would appear, as might be expected, that such families have a definite advantage over the average of the community both in the quantity and quality of foods consumed, this being especially noticeable as regards milk, butter, and potatoes, although they may lack the variety which they would choose if the opportunity were

[1] THE LANCET, 1935, i., 1469.
[2] Quarterly Bulletin, June, 1935.
[3] Welsh Journal of Agriculture, 1935, xi., 48

afforded. These observations are obviously not applicable to the case of the farm labourer, whose family dietaries are apt to be lacking in first-class protein and whose children, walking considerable distances to school, often suffer from the lack of a proper midday meal.

CONSUMPTION OF MILK

Burnet and Aykroyd devote a good deal of attention to the special value of milk as an article of diet and the efforts which have been made to promote its consumption. Figures are frequently quoted as to the relative quantities consumed in different countries, but comparatively little is known about the use of milk in different social classes and the form in which it is purchased. Two recent inquiries made in Cardiff [4] and the distressed areas of South Wales [5] by the Department of Agricultural Economics of Aberystwyth University College are therefore of interest. In the former four samples each of about 100 families were investigated, grouped roughly as good middle class, good working class, new housing area and poor working class. Figures are given showing the decline of consumption of liquid milk from 0·55 pint per head per day to 0·16 with descent in the social scale, and the reverse process as regards tinned milk (mostly skim). Among the poorer families those with children purchased less milk on the average than those consisting entirely of adults, and many children received nothing but skimmed condensed milk. In the Rhondda valley there is less distinction of class and less variation in milk consumption. The daily consumption of liquid milk (including public supplies) over 602 families averages 0·236 pint per person, raised to 0·327 pint when forms of "milk-stuff" such as tinned and dried milk (but not cream) are included. As another recent investigation showed,[6] more liberal public assistance and supply of free milk in the Rhondda than in Cardiff seems to be associated with a better state of nutrition in the poor children of the former area.

SCHOOL MEALS

The administration of supplementary feeding of school-children continues to be a subject of controversy. The points at issue are connected with the practice of the Unemployment Assistance Board of making deductions from family allowances in certain instances in consideration of free meals granted to children by education authorities; and the medical selection of children for free meals which the Board of Education demands. As to the former no public health question seems to arise if the scales of assistance can be regarded in themselves as adequate to maintain the physical fitness of a family and the deductions are equitable. On the second point the essential criticism is that the detection of incipient malnutrition is beyond the skill of the medical practitioner within the time available for the purpose and that, in its logical application, every child who appears to have reached normality ought to be deleted from the list of grantees until he presents fresh evidence of deprivation. Operation on these lines of Section 84 of the Act of 1921 is not a procedure with which either education authorities or the medical profession desire to be associated. In fact it is rarely, if ever, interpreted in this way, but some medical officers find themselves troubled with qualms of conscience when invited to certify children whose family circumstances are poor but whose physique is apparently unimpaired. It would seem that medical selection of grantees for free milk, at least, should not be enforced, for the cost is not great and the mental, as well as the physical, benefits of extra milk rations have been so repeatedly and convincingly demonstrated among those otherwise normally fed that the case for raising the general standard of nutrition by its liberal administration is overwhelming. The British Medical Association has expressed its disagreement with the Board of Education's policy in this respect, and most school medical officers concur. The scheme could hardly be worked without an intolerable amount of friction and discontent—except in the spirit of make-believe which the Board tacitly encourages—unless the whole framework of the school medical service were radically reformed. Such a reform, involving continuous contact of the school medical department with each child throughout his school life, is perhaps desirable, but that is at the moment a reformer's dream.

[4] Ibid., 1934, x., 83.
[5] Ibid., 1935, xi., 23.
[6] Brit. Med. Jour., June 22nd, 1935, p. 1256.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED JULY 27TH, 1935

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 0; scarlet fever, 1612; diphtheria, 983; enteric fever, 49; acute pneumonia (primary or influenzal), 386; puerperal fever, 36; puerperal pyrexia, 109; cerebro-spinal fever, 15; acute poliomyelitis, 18; acute polio-encephalitis, 3; dysentery, 13; ophthalmia neonatorum, 97. No case of cholera, plague or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on August 2nd was 2611, which included: Scarlet fever, 724; diphtheria, 945; measles, 40; whooping-cough, 427; puerperal fever, 20 mothers (plus 4 babies); encephalitis lethargica, 268; poliomyelitis, 5. At St. Margaret's Hospital there were 22 babies (plus 12 mothers) with ophthalmia neonatorum.

Deaths.—In 121 great towns, including London, there was no death from small-pox or enteric fever, 9 (0) from measles, 2 (0) from scarlet fever, 20 (10) from whooping-cough, 23 (3) from diphtheria, 48 (8) from diarrhœa and enteritis under two years, and 19 (4) from influenza. The figures in parentheses are those for London itself.

Again no general increase is reported in the deaths from diarrhœa and enteritis, but Liverpool reported 14 and Birmingham 3. Fatal cases of whooping-cough increase as fatal cases of measles diminish: 15 of the 20 deaths occurred in Greater London, 2 in Manchester. Liverpool reported 5 deaths from measles, Sunderland 2. Of the fatal cases of diphtheria 3 occurred at Bradford, 2 each at Tottenham and Liverpool.

The number of stillbirths notified during the week was 275 (corresponding to a rate of 39 per 1000 total births), including 38 in London.

LONDON ASSOCIATION OF THE MEDICAL WOMEN'S FEDERATION.—The July meeting of this association was held at the British Postgraduate Medical School, Ducane-road, Shepherd's Bush. After welcoming the members to this new school, Prof. F. R. Fraser noted the broad differences between the types of clinical cases seen at Hammersmith Hospital (London County Council) to which it is attached and the voluntary hospitals. He showed some typical cases of rheumatoid arthritis, demonstrating the difference in mobility of joints and in general well-being between cases which had come under observation and treatment at an early stage and those which had been neglected. He emphasised the importance of keeping the joints moving and the value of heat, however applied, in treatment. He also showed cases of osteo-arthritis and contrasted cases of heart disease in which the primary failure was on the right and on the left sides. Finally he showed a child with blue sclerotics and fragile bones. After the meeting the members were shown round the pathological department of the school.

CORRESPONDENCE

THE TOXICITY OF AVERTIN

To the Editor of THE LANCET

SIR,—The report by Dr. Cole in your last issue of a case of tetanus treated with continuous avertin anæsthesia confirms the belief of many that the toxicity of this drug to the liver has been exaggerated. Prof. Anschütz, of Kiel, informed me in 1932, and again in November, 1934, that he does not believe that avertin is a liver poison even if this organ were diseased. He continues to have good results with avertin in jaundiced patients even when the bilirubin figure is four times the normal. After operation he gives a large intravenous infusion of 5 to 10 per cent. glucose solution. He stated also that Kirschner, of Tübingen, has given 250 g. avertin to a 9-year-old boy for the treatment of tetanus.

During a recent visit to the United States and Canada, where the use of avertin is increasing, I could not obtain any evidence of liver damage. Wesley Bourne, of Montreal, who has given avertin in well over 1000 cases, is now giving it in full doses to children, doses that is to say up to 0·15 g. per kg., to obtain complete anæsthesia.

I have administered avertin on nearly 1700 occasions; no fatality has occurred which could be even remotely ascribed to liver failure. Fifty-nine patients have been operated on under avertin for disease of the biliary tract; two were suffering from jaundice and toxæmia, one due to acute cholecystitis and the other due to peritonitis; they were given full doses of avertin and made uninterrupted recoveries. In the whole series jaundice has occurred on but two occasions. An alcoholic woman was given a full dose of avertin and gas-and-oxygen with a considerable quantity of ether; the operation for removal of the gall-bladder revealed a condition of early fatty cirrhosis of the liver. Slight jaundice developed and cleared up in three days. The other case was that of a child with a long history of acidosis, whose tonsils were removed under avertin, gas-and-oxygen, and ether. He made a good recovery, but whilst in the nursing-home developed symptoms of appendicitis. Three weeks after the first operation the appendix was removed, again under avertin, gas-and-oxygen, and ether. Jaundice of a mild degree started four days afterwards and quickly cleared up. I have given avertin twice to a child in 14 hours, normal recovery ensuing. It will be noticed that both patients in my series who developed jaundice had been given ether; neither of the patients who were jaundiced at the time of operation was given ether. I am upheld in my view that ether should be avoided in these cases by Prof. Anschütz who has completely given it up for patients with severe jaundice.

The oft-quoted experiments of F. B. Parsons have, I submit, received undue attention. Prof. E. D. Adrian who reported on this work states that "his results, though negative, are of considerable value as they show that avertin has not the toxicity to the liver which seemed probable from earlier work" (Brit. Med. Jour., 1932, ii., Suppt., 170).

I am, Sir, yours faithfully,

FRANCIS E. SHIPWAY.

York-terrace, N.W., August 6th.

PROCTALGIA FUGAX

To the Editor of THE LANCET

SIR,—In your last issue Dr. Hess Thaysen of Copenhagen has drawn attention to a peculiar visceral neurosis, which must, I think, be fairly common. A number of cases have come my way. Several have been in medical men. They tend to occur especially at times of fatigue and stress. I would particularly draw attention to the nocturnal incidence of the symptom, and agree with him that it is almost certainly a rectal rather than an anal phenomenon. One medical patient of mine tells me that she can obtain the quickest relief by inflation of the rectum with air, and for this purpose she keeps a rectal tube and bulb handy, both at her bedside and in her laboratory. Relief by this means suggests that the basis of the pain is probably spasm. Some of the painful colonic neuroses are similarly relieved by warm enemata.

I have notes of cases in which this tendency to acute but transient attacks of rectal pain occurred in association with colon spasm, or with other well-recognised allergic disorders. In none of my cases has there been any evidence of tabes dorsalis or of any local organic condition to explain the predisposition to these distressing crises. Not infrequently they engender a fear of organic disease, but the description of the attacks, their duration, and other associations, together with an ordinary examination usually allow a full reassurance.

I am, Sir, yours faithfully,

Wimpole-street, W., August 2nd. JOHN A. RYLE.

To the Editor of THE LANCET

SIR,—Dr. Thaysen's contribution on rectal pain is interesting, but raises one or two points which require comment. The histories of the cases cited resemble closely the stories told one by sufferers from rectal crises, so that unless a test was done in every case it would be difficult to exclude tabes as being an underlying cause. Another possible explanation of pains of such severity is dilatation of a hollow viscus. No amount of rectal dilatation will cause pain, so that it is possible that the rectal pain may be due to dilatation of a ureter, the nerve-supply, both spinal and autonomic, being similar. Extension of the pain peripherally could be accounted for by the distribution of the obturator nerve. Gravel has not the sonority of that hexameter ending proctálgia fúgax, but I suggest that it may occasionally cause a true rectal crisis.

It is a pity that the patient who "thought he was able to detect some swollen veins in the rectum" was not further interrogated. It is impossible to feel swollen rectal veins digitally, so what ingenious arrangement enabled him to examine his own fundament?

I am, Sir, yours faithfully,

Harley-street, W., August 3rd. CHRISTOPHER HOWARD.

"NATUROPATHS"

To the Editor of THE LANCET

SIR,—In your issue of July 13th I gave an account of some recent activities of the medical herbalists. I would like to-day to refer to another cult, the "Naturopaths," who since 1934 have "established a register" which it is declared "is designed to protect the public and the fully trained naturopath from those who with inadequate knowledge claim to practise as "Nature-cure physicians."

I have before me a form of registration issued by this body on which the applicant is asked to specify types of treatment which he gives, and the following are cited as examples of such treatment: "psycho-analysis, colonic lavage, electrotherapy, biochemistry, herbal medicine, orificial surgery, &c." A circular

issued with the application-form makes the following statement:—

"Our standard of professional education is four years' full-time training with clinical experience. As the profession is still young, however, it has been impossible for many now in practice to obtain such a complete equipment. We are therefore following the example set by other young professions, and accepting proportionate experience in practice in lieu of a certain amount of training. Full information regarding both should be supplied on the printed form."

An applicant for registration may have to submit to an "examination" for which a fee of two guineas is payable on application. "Cheques to be made out to the treasurer of the Incorporated Society of Registered Naturopaths."

It seems to be common form with the irregular cults (probably in imitation of the most blatant of them, osteopathy) to name "four years' training" as the basis of "professional education," but no mention is made in the literature supplied to the applicant for registration in Naturopathy of any schools at which training can be given. The "British School of Osteopathy," "founded in 1917," posed, until its recent devastating exposure by the Select Committee of the House of Lords, as giving its "graduates" a "four years' course," the first two of which were declared to be "the same course as medical students take," and the dean of the school received the honour of publication of a half-column letter in large print in the *Times* of Nov. 6th, 1933. The recent Bill for Registration of Osteopaths gave the British School of Osteopathy the fullest recognition and proposed that it should be represented upon the board which was "to enforce a prescribed standard of education" and "keep a register similar to the register maintained by the General Medical Council," and yet the Lords' Select Committee found that the British School of Osteopathy "was exposed in the course of evidence before us as being of negligible importance, inefficient for its purpose, and, above all, in thoroughly dishonest hands."

The present rage for setting up "registers" of bodies of irregular practitioners and "schools" for their training is a phenomenon which I think deserves careful consideration by the medical profession. I have drawn the attention of the Minister of Health to the scandal presented by these schools which fraudulently pretend to qualify persons to practise various branches of medicine and surgery, and I have received to-day a letter containing his promise to look into the matter.

I am, Sir, yours faithfully,

House of Commons, August 2nd. E. GRAHAM-LITTLE.

HEADACHES

To the Editor of THE LANCET

SIR,—I am grateful for Dr. Geoghegan's kindly reference in your issue of July 20th to my Croonian lectures. As regards "neurasthenia" and "nervous exhaustion," there are two elements in any form of nervous breakdown, however slight: (1) the weakness or instability of the patient's nervous system, (2) the strain to which it has been subject. In some cases, after examination of the patient and consideration of his story, the physician forms the view that the first factor is the chief one. Among these were the neurasthenics. If the strain has been excessive and the patient is judged to have been less unstable before it than those in the first class, he is counted among the cases of nervous exhaustion. This is a clinical classification which I believe to be useful. It affects prognosis as well as diagnosis.

The word "worried" relates to external and sometimes lesser stresses in a person whose nervous system is thought to be of average stability. It is not really mine, and I do not like it. In the notes, however, taken by various physicians and in the letters from the family doctors, it occurred so often—e.g., "worried about business," "worried about children's health"—that I thought it better, in a summary of clinical records, to put it in than to translate it.—I am, Sir, yours faithfully,

Ruthin Castle, N. Wales, July 31st. EDMUND SPRIGGS.

A LESSON IN ANATOMY

To the Editor of THE LANCET

SIR,—A neat though painful demonstration in practical anatomy which I had yesterday may interest some of your readers. While picking lavender in the garden, and sniffing it enthusiastically, I felt a tingling in the left nostril. After sneezing convulsively for a few minutes, I finally blew hard and ejected an ant, which had evidently stung me. Intense pain and a certain amount of swelling and lacrymation rapidly developed, and there was pain nearly as intense in the left upper alveolus and the left hard palate, illustrating most effectively the intimate connexion between the nasal branch of the mandibular nerve (second div. of the Vth) and the anterior superior alveolar branch. Some pain radiated into the left ear, but barely reached the eye.

What interested me was the feeling of familiarity about the pain in the alveolus, as I frequently have neuralgia there (where the teeth have long since gone); and a recurrent herpetic eruption and ulceration in the hard palate comes just where the pain was worst yesterday. I realised that I should have been treating the nose, where I did not suspect infection, for this troublesome condition. Swabbing inside the nose with hot sod. bicarb. solution gave a little relief, and after about an hour the pain and swelling died away.

The ant, I may say, was not dead, and I left it on the edge of my handkerchief to dry, whence it later took its departure.

I am, Sir, yours faithfully,

Princes Risborough, Bucks, August 2nd. J. WILTSHIRE.

A SALARIED SERVICE OF MIDWIVES

To the Editor of THE LANCET

SIR,—I have read in THE LANCET of August 3rd a letter from Miss Carter, organising secretary of the Midwives' Institute, and I would like to endorse all that she has to say. There can be no doubt that a salaried service of midwives will have to come and it is only right that those midwives who have been working for a number of years under unfavourable conditions should have an opportunity, as Miss Carter suggests, of being included in this service or should receive some compensation for giving up altogether.

After having watched the work of midwives for a number of years I most heartily agree with Miss Carter when she says that "it is generally recognised that midwives in this country . . . can show amazingly good results and an honourable record of the care of their patients." It is certainly high time that things were made more favourable for midwives, as the conditions under which they have been working in the past are truly deplorable and would not be tolerated by any organised trade-union for a moment. They are expected to work 24 hours a day, live in wretched quarters, and have nothing to look forward to in their old age. It is quite common for a medical man when he is called to a midwife's case to find that

that midwife has been on duty with that case 24 hours, and it is truly the duty of the medical profession to see that these things are altered. That they can be altered I have not the slightest doubt, and it appears to me that the easiest way to bring this about would be for medical men to refuse to work with any midwife who was not receiving proper remuneration and living under satisfactory conditions.

I do not think there can be any doubt that an important contributory factor to our maternal mortality is fatigue on the part of the attendant. The midwifery service of the future, I believe, will be one worked very largely by midwives who will work under proper conditions of service and will be allowed to administer to their patient some form of relief—chloroform or gas-and-air analgesia—during their labours. In this way both midwives and mothers will be greatly benefited.

I am, Sir, yours faithfully,

Station-road, New Barnet, August 2nd. JOHN ELAM.

THE EVOLUTION OF MEDICAL POLICY AND PRACTICE

To the Editor of THE LANCET

SIR,—Your leading article of August 3rd on contract practice foreshadows the development which is likely to occur. Will this be accompanied by an evolution in the present policy for the treatment of patients? There are several possibilities. Will the present system of individualism with a large measure of inevitable inefficiency be perpetuated?—That this is so now is shown by the crowded out-patient departments of the voluntary hospitals. Will there be a large extension of this system for suburban areas by municipal hospitals supported by the rates? Will there be an extension of the school medical service to deal in the first instance with adolescents and finally with adults?

Will a complete State medical service be formed to deal with all or nearly all the population? Or will doctors coöperate to provide at their own expense a first-rate medical service for the whole population, and will they make the health of all their aim in life, trusting to a wide extension of the insurance system to make this possible?

Medical work has become more exact and needs expensive apparatus and workers specially trained to use it. This is true not only for X rays and micro-scopy but also for investigating those areas in the body where special forms of illumination are needed. No single general practitioner or specialist is likely to be able to provide all the apparatus for the newer forms of physical treatment. A group of practi-tioners and specialists could do so? A "medical house" with a clerical staff, consulting-rooms, and nurses, a laboratory, X ray room, baths, and electrical treatment rooms would replace the usual consulting-rooms found in the houses of most doctors. The standard of practice where one of these existed would be raised in a whole district.

An imperfect analogy may make clear the main point in my mind. When a motor car needs atten-tion would we prefer to take it to a small garage or to a modern service station? A motor car is simplicity itself compared to our bodies.

I am, Sir, yours faithfully,

August 5th. A. R. FRIEL.

BLEEDING OF TRANSFUSION DONORS

To the Editor of THE LANCET

SIR,—I have tried several devices for facilitating the removal of blood from the donor's vein, including the use of a pump. My present choice is not a com-plicated apparatus, but something very simple. I use an ordinary stainless Record needle, No. 15 B.W.G., with a sharp point and a short bevel, attached to about two feet of rather narrow rubber tubing, No. 10 Arnold. About six inches from the needle the length of tubing is broken by a glass connexion which acts as a window. At the operation the tubing hangs loosely and therefore almost vertically into a flask held just above floor level by an assistant. I have found that a pint of blood can almost invariably be collected in under ten minutes with the greatest ease. I think the secret lies in the long tubing which acts as a siphon.

In giving blood to the recipient, there is one problem which I believe has not yet been solved—how to insulate that tubing between the flask and the patient's arm to prevent the blood from cooling. Both a short tube and wrapping round the tube obstruct the ease of approach to the vein. I suspect cooling of the blood is one factor in subsequent reactions, and hence the problem is of importance.

I am, Sir, yours faithfully,

Nottingham, August 5th. P. H. O'DONOVAN.

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS

Summer Adjournment

ON August 2nd both Houses of Parliament ad-journed for the summer recess until Oct. 29th. Resolutions were passed to the effect that both Houses may meet at an earlier date at the discretion of the Lord Chancellor and the Speaker of the House of Commons. In the House of Lords the Royal Assent was given to 95 Acts, including the following: Appropriation Act, University of Durham Act, Diseases of Animals Act, Criminal Lunatics (Scot-land) Act, Public Health (Water and Sewerage) (Scotland) Act, Housing Act, Housing (Scotland) Act, Government of India Act, National Health Insurance and Contributory Pensions Act, Restric-tion of Ribbon Development Act, Ministry of Health Provisional Order Confirmation (Leigh Joint Hos-pital District) Act, Ministry of Health Provisional Order Confirmation (Cuddington Joint Hospital District) Act, Ministry of Health Provisional Order Confirmation (Fylde, Preston and Garstang Joint Small-pox Hospital District) Act, Ministry of Health Provisional Order Confirmation (Ottershaw Joint Hospital District) Act, Hertfordshire County Council Act, and St. Bartholomew's Hospital Act.

On Wednesday, July 31st, the Voluntary Hos-pitals (Paying Patients) Bill was read a second time in the House of Commons.

University of Durham Commission

Under the University of Durham Act, 1935, which has now received the Royal Assent, the following Commissioners are entrusted with making Statutes for the University and its constituent Colleges: The Rev. F. H. Dudden, D.D. (chairman), Countess Grey, C.B.E., Sir W. Ross Barker, K.C.I.E., C.B., Mr. J. H. Priestley, D.S.O., Mr. C. Williams, O.B.E., M.A., Mr. G. R. Murray, M.D., D.C.L., F.R.C.P., Mr. T. F. Sibly, D.Sc. LL.D., Mr. A. Wood, D.Sc., with Mr. A. C. Dawes, B.A., LL.B., as secretary.

A New Attested Herds Scheme

In the House of Lords on Aug. 1st Earl DE LA WARR, Parliamentary Secretary to the Ministry of

Agriculture, admitted that the Attested Herds Scheme was not being taken up by the average farmer. They were therefore putting forward proposals for altering the scheme. In addition to the bonus of one penny per gallon on milk from attested herds sold through the provisions of the Milk Marketing Scheme it was proposed to offer additional financial assistance to herd owners in suitable cases. Where an owner could produce veterinary certicates showing that he had reduced the number of reactors to the tuberculin test in his herd to not more than 10 per cent. the Ministry would be prepared to consider an application for a contribution towards further tests of the herd up to a maximum of four tests in order to assist the owner to complete the eradication of the disease and enable him to qualify for attestation. The contribution would be at the rate of £1 1*s.* plus 2*s.* 6*d.* for each animal tested in respect of each herd test.

Secondly, in place of the single official test at present required to determine the final qualification of a herd for a certificate of attestation, the Ministry would be prepared, in cases in which one or more reactors were found at such test, to repeat the official test at intervals of between 60 and 90 days for a maximum of three further herd tests before refusing the application. The cost of all official tests was defrayed by the Ministry.

Thirdly, herds undergoing a series of assisted or official tests under the foregoing provisions would be termed supervised herds and be subject to certain rules for the purpose of preventing the reintroduction of infection. To assist the owners of these supervised herds to obtain the right type of cattle to replace reactors the Minister would be prepared to make a contribution of from £3 to £5 towards the cost of replacing a reactor of the same class, except that no contribution would be paid towards the cost of an animal under 21 months' old unless the animal was a bull which had been licensed by the Ministry under the Improvement of Livestock (Licensing of Bulls) Act. The larger sum of £5 would be contributed towards the cost of obtaining an animal from an attested herd, £3 being the amount of the contribution in respect of an animal from any other herd. It was estimated that in the case of the average herd containing, say, twenty milking cows, the contribution towards the cost of testing would be £38, and on the assumption that a contribution would be made in respect of eight reactors on the average for each supervised herd the amount of such contribution towards the replacement of reactors would be £32, bringing the total additional financial assistance thus afforded to about £70. The operation of these provisions would be carefully watched, and in any event they might only be available during the period of four years specified in Section 9 of the Milk Act, 1934.

The intention of these proposals was to afford special assistance to the owners of suitable herds to complete the task of cleaning up their herds with a view to qualifying for attestation as tubercle-free herds, and it was hoped that they would produce a satisfactory response from herd owners.

Alcohol and Motor Driving

In the House of Commons on Aug. 2nd, on the motion for adjournment, Mr. ISAAC FOOT called attention to the report recently issued by the British Medical Association in answer to a request from the Minister of Transport (see THE LANCET, Aug. 3rd, p. 259) on the question of the effect of alcohol on motor drivers. The importance of the report lay in the attention it drew to the effect of the sub-intoxicant dose of alcohol, an amount less than that customarily regarded as rendering a person under the influence of drink or incapable of having proper control of a vehicle. The real danger upon the roads was not the drunken man but the man who was in charge of a dangerous machine and who had taken sufficient alcohol to give him a false confidence. There was, he thought, a definite obligation on the Ministry of Transport, and indeed on the House of Commons, to see that those facts were made known to all concerned. The fact that something like 80 to 90 per cent. of the municipalities of the country, and the great public utility companies, made abstinence a condition of service for men who were driving vehicles or acting as conductors was in itself conclusive evidence. He suggested that the report should be more widely published.

Captain AUSTIN HUDSON, Parliamentary Secretary to the Ministry of Transport, agreed that the more publicity the report obtained the better the effect would be. Between the time when the report was asked for and the time when it was received the Ministry, he said, inserted in the Highway Code a reference to the use of alcohol which said: "Before using the road be sure that your alertness or sense of caution is not affected by alcohol or fatigue." The Highway Code had a circulation of some 13,000,000 or 14,000,000, and was being widely read. He thought that Mr. Foot was wrong in thinking that the Ministry were not giving enough publicity to this question of alcohol. In the B.M.A. report the last sentence of all was, he thought, the most important. This ran:

"After taking alcohol he may believe himself"—that was the driver—"to be driving better, but in fact, his body works less efficiently. This adverse effect generally occurs even if alcohol is taken in moderate quantities some hours before driving, and especially if taken in the absence of food."

He hoped that publicity would be given to that statement.

HOUSE OF COMMONS

WEDNESDAY, JULY 31ST

Nursing-homes and Traffic Noise

Mr. LENNOX-BOYD asked the Minister of Transport whether he was aware that there were one or more streets in London wholly occupied by nursing-homes and institutions; and whether, in the case of such streets, he would consider controlling heavy traffic, at any rate during the hours of the night and early morning.—Mr. HORE-BELISHA replied: If my hon. friend will furnish me with the names of the streets he has in mind I will have the matter examined.

Alcohol and Motor Driving

Sir FRANCIS FREMANTLE asked the Minister of Transport if he had considered the report of the committee of the British Medical Association on the influence of alcohol on motor driving; whether he would issue the report for the use of members of Parliament; and what action he proposed to take in the matter.—Mr. ISAAC FOOT asked a similar question.—Mr. HORE-BELISHA replied: The report to which my hon. friends refer was issued with the *British Medical Journal* for July 27th, and is therefore generally available. The report does not itself suggest to me any definite line of action, but I am sure that the public will be grateful to the British Medical Association for the time and trouble they have taken in carrying out this inquiry, and for the interesting material which it contains.

Dwelling-houses and Air Raid Protection

Mr. NEIL MACLEAN asked the Home Secretary the estimated cost of making the rooms in an average sized dwelling-house gas proof against air raids.—Sir J. SIMON replied: The cost of protecting rooms against gas would vary according to the size and construction of each room, the number of windows and doors and the state of repair. It is not contemplated that in an ordinary house more than one room should be made fully gas proof, but in addition a double gas-proof door, or air-lock, should be provided at the outer door of the house. I am advised that the cost of materials needed to construct this air-lock and to protect one room that was in reasonably good repair ought to be less than £1, exclusive of blankets and rugs which might be assumed to be available in the house. I am having special investiga-

tion made of the simplest methods of providing the necessary protection so that the cost of materials may be kept to a minimum and that the ordinary householder may, if he wishes, do the work himself.

THURSDAY, AUGUST 1ST

Miners' Nystagmus and Workmen's Compensation

Mr. GODFREY NICHOLSON asked the Home Secretary the terms of reference and the name of the chairman of the committee which he proposed to appoint to inquire into the operation of the Workmen's Compensation Act in relation to workmen affected by miners' nystagmus.—Sir J. SIMON replied: Briefly, the matters on which the committee will be invited to report are the operation of the Act in relation to miners' nystagmus; the position of the medical referees under the Act, and the arrangements generally for dealing with medical issues, and certain important questions arising in connexion with the settlement of claims by payment of lump sums. I am glad to state that His Honour Judge Stewart has consented to act as chairman of the committee.

Hospital Patients and Precautions against Air Raids

Mr. DOBBIE asked the Home Secretary whether, in the provision of gas masks for protection of the civil population during air raids, arrangements would be made for masks of a size and kind suitable to children; and if arrangements were being made to safeguard patients in hospitals and institutions where the inmates were unable to look after themselves.—Captain WALLACE, Under-Secretary, Home Office, replied: Yes, Sir; these matters will be considered.

Mr. MORGAN JONES asked the Home Secretary whether the gas-mask which was being advised by the Government for use by the civilian population would be able to resist the action of suffocating vesicant and corrosive gases; for how long the masks would offer protection in use; and whether materials were available for the making of such gas-masks in quantities for the whole civilian population, with quantities sufficient to allow for reserves and for deterioration and damage.—Captain WALLACE replied: The Government will only recommend the use of respirators which will afford protection against all known forms of gas which it would be practicable to use in war, for periods believed to be sufficient for the wearers to reach safety. Persons who might have to remain at work in gassed areas would need respirators giving a longer period of protection. It is not at present possible to quote precise figures of the duration of protection of different types of respirators. There is no reason to anticipate any difficulty in the supply of materials for the full number of respirators required.

Milk-supplies to Hospitals

Mr. LEONARD asked the Minister of Agriculture if he was aware that the vice-chairman of the Scottish Milk Marketing Board had stated that the Board were sympathetic to the request of hospitals and infirmaries for a special rate for milk-supplies, but were restrained by the fact that legislation bound them only to apply special rates to what could be termed a new demand; and if he would amend the Act so as to permit public institutions to have the advantage of special terms for milk.—Sir GODFREY COLLINS replied: The statement referred to has not come under my notice, but it is doubtless the case that the Scottish Milk Marketing Board are not in a position to give special terms to the hospitals and other such institutions in the absence of provision for Government assistance for such a purpose in the Milk Act, 1934. As stated in reply to previous questions, the matter raises large issues of policy, which will have to be considered in conjunction with the report of the Milk Reorganisation Commission.

Paratyphoid in Essex

Mr. THORNE asked the Minister of Health if he could give any information in regard to the outbreak of paratyphoid at Grays, Essex, and neighbouring towns; what action was being taken to prevent the disease from spreading; and what was the cause of the outbreak.—Sir KINGSLEY WOOD replied: I understand that 21 cases of paratyphoid were notified in the urban districts of Grays Thurrock, Purfleet, and Tilbury, and the rural district of Orsett, in the six weeks ending July 27th. The outbreak has been under investigation by the medical officer of health and a visit has been paid by a medical officer of my department. All cases were promptly isolated and the routine disinfection carried out. The cause of the outbreak has not yet been determined but investigations are still in progress.

OBITUARY

DAVID RICE, M.D. Brux., M.R.C.S. Eng., D.P.H.

WE regret to record the death of Dr. David Rice which occurred on Wednesday, July 31st, at Lower Hellesdon, where he had been lying ill for some three months. He was the son of the Reverend C. H. Rice, rector of Cheam, and was educated at St. Columba's College, Dublin, and Guy's Hospital. He took the English double qualification in 1898 and immediately started on his successful career as an alienist. He was for a time attached to the Bethlem Royal Hospital, and from 1899 to 1907 he was medical officer at Staffordshire County Asylum. He was later appointed medical superintendent of the Hellesdon Hospital, Norwich, a post which he held for 27 years, acting also as medical adviser to the Norfolk Committee for the Care of the Mentally Defective. He was particularly well read in his subject, was up to date in his views, and a capable administrator, so that he gained rightly a high reputation for his achievement at Hellesdon. Outside his professional work Dr. Rice was a great lover of music, while he had been a prominent cricketer. He leaves a widow, two sons, and a daughter.

EDWIN ALBERT CHILL, O.B.E., M.D. Edin.

THE death occurred suddenly on July 23rd of Dr. E. A. Chill, at his home at Battle where he was living in retirement. He was born in Burma in 1861 and educated at King's College School, London, proceeding for his medical training to the University of Edinburgh. He graduated in 1883 as M.B., C.M., proceeded to the M.D. degree, and held several appointments in London as clinical assistant, notably at Great Ormond-street Children's Hospital and the Central London Throat, Nose, and Ear Hospital. He was then for a period in practice in Ealing, a member of a very successful firm, and during the war as a captain R.A.M.C. was commandant of the Ealing V.A.D. auxiliary hospital at Southall. His connexion with the V.A.D. was important, for he was chief commandant of the Middlesex organisation and assistant county director of the British Red Cross and Order of St. John. At the conclusion of hostilities he received the O.B.E. He was a prominent freemason and published at various times lectures on anthropology and freemasonry.

ALFRED JOSEPH McCONNELL, M.B., Ch.B. Edin.

Dr. A. J. McConnell was born in Ballymena, Antrim, in 1886, the son of William McConnell, of Trostan, Ballymena. He was educated at Ballymena Academy and received his medical training at the University of Edinburgh. He graduated in 1909 as M.B., Ch.B., and following his qualification held the post of assistant resident medical officer at Smithdown-road Hospital, Liverpool, until 1912. He then settled down in general practice, but on the outbreak

of war joined the R.A.M.C. with the rank of captain and served with the corps from 1916 until the conclusion of hostilities, spending the greater part of the time in Salonika. After the war he returned to Liverpool and resumed his practice, which he was carrying on at the time of his death, which occurred after a short illness at the age of 49.

J. C. R. writes: "The district of South Liverpool and those of his colleagues who knew him regret sincerely the recent death of Dr. A. J. McConnell. He was one of the most unassuming men in Liverpool, but both colleagues and patients alike were invariably impressed by his genial personality and unobtrusive kindliness. He was especially expert in midwifery, and many patients have good cause to thank him for his skill and judgment. He leaves a widow and a family of six children, two of whom are medical students."

ARTHUR ALAN MILLER, M.D. Durh., L.R.C.P. Lond., M.R.C.S. Eng.

Arthur Alan Miller, who died on July 17th, had been in ill-health for some time though remaining courageously at work.

The second son of the late G. W. Miller, he was born in 1874 and educated at Forest School, Walthamstow, entering Guy's Hospital in 1893 where he had a successful medical career as a student. He was one of the most popular men who ever entered Guy's, for he was a clever amateur actor and also a good dramatic writer. He had a very large share in the Guy's Hospital paper, "The Guyoscope," the most successful of all hospital comic issues while it lasted. Thus he was invaluable at all hospital concerts and dramatic entertainments, and Mr. Eason, the superintendent of Guy's, writes that no one in the last generation has ever quite filled his place in the social life of the hospital. After qualification he was house physician at the General Infirmary, Northampton, and later took the degree of M.D. Durh. He now practised for a few years in Sutton, but moved to Westminster not long before the war, and while practising there and also in the City of London he published a book on the care of children, a subject where he was able to show the practical knowledge gathered from an appointment at the Evelina Hospital.

Early in the war he joined the R.A.M.C., and saw varied service in casualty clearing stations in France, Mudros, Egypt, and Italy, and was mentioned in dispatches. The end of the war found him acting lieut.-colonel in command of a casualty clearing station on the Italian front, and later he served for six years at the Ministry of Pensions. He then resumed his practice in the City where he was medical adviser to several important banks and companies.

In 1924 he married Eleanor, daughter of the late Rev. J. C. Street, and leaves a young son.

Throughout his life Dr. Miller remained interested in the stage. He wrote several sketches for Arthur Roberts and George Graves, and among his plays was "The Gipsy Princess," "A Night Out," "The Early Girl," and "Motherhood," while in conjunction with George Arthurs he wrote the Aldwych farce, "Marry the Girl."

MEDICAL NEWS

University of Oxford

On August 3rd the degree of B.M. was conferred on N. E. R. Archer, A. Fearnley, A. H. Hunt, T. W. H. Porter, and K. C. Royes.

University of Cambridge

The John Lucas Walker studentship for original research in pathology has been awarded to Mrs. M. E. Adair, Ph.D., who was recently a junior Beit memorial fellow. The Gwynaeth Pretty studentship for the encouragement of research in the ætiology, pathology, or treatment of disease, and the Nita King research scholarship for original research in the ætiology, pathology, and prevention of fevers have both been awarded to Dr. Reginald Passmore.

On August 3rd the following degrees were conferred:—

M.D.—G. J. V. Crosby.

M.B., B. Chir.—G. Blackburn, S. M. Evans, M. Hynes, H. B. D. Kettlewell, H. T. Laycock, C. W. A. Searle, T. M. Tyrrell, and J. N. Warren.

M.B.—W. S. Haynes, H. J. M. Robinson, and R. J. Still.

B. Chir.—A. W. Abramson, T. G. Armstrong, C. E. Bevan, W. G. Brander, G. R. Debenham, T. S. R. Fisher, A. R. Kelsall, W. A. Law, P. E. C. Manson-Bahr, J. H. Stothert, G. C. Tooth, and J. G. Webb.

University of London

Mr. Maxwell Ellis has been re-elected to the Duvene studentship in oto-rhino-laryngology for a further year. At the M.B. examination in May the university medal was awarded to Graham Hayward of St. Bartholomew's medical college.

At recent examinations the following candidates were successful:—

M.D.

Branch I. (Medicine).—F. R. Bettley, Univ. Coll. Hosp.; C. R. Birnie, King's Coll. Hosp.; K. C. Buck, St. Mary's Hosp.; Anthony Caplan, St. Bart.'s Hosp.; S. B. Dimson, Univ. Coll. Hosp.; A. E. Francis, St. Bart.'s Hosp.; D. H. Fulton, King's Coll. Hosp.; T. G. F. Hudson, St. Thos. Hosp.; I. G. Jones, Univ. Coll. Hosp.; Alexander Kahan, St. Thos. Hosp.; C. B. Lanyon, Univ. Coll. Hosp.; L. J. M. Laurent, Univ. Coll. and Univ. Coll. Hosp.; H. G. McComas, Guy's Hosp.; Ian More and R. S. Ogborn, Univ. Coll. Hosp.; Ruth Pumphrey, Univ. Coll. and Univ. Coll. Hosp.; R. S. Risk, St. Bart.'s Hosp.; K. M. Robertson, St. Thos. Hosp.; V. E. P. Senewiratne, Ceylon Med. Coll. and Univ. Coll. Hosp.; Rupert Shelley, St. Thos. Hosp.; Rupert Sykes, Victoria Univ. of Manch.; Joan B. Walker, Lond. (R.F.H.) School of Medicine for Women; Mary J. Wilmers, King's Coll. Hosp.; and J. L. Woodhouse, Guy's Hosp.

Branch II. (Pathology).—N. F. Maclagan, Middlesex Hosp.

Branch III. (Psychological Medicine).—J. G. Hamilton, Lond. Hosp.

Branch IV. (Midwifery and Diseases of Women).—Olive M. Midgley, London (R.F.H.) School of Medicine for Women; L. N. Reece and C. P. Scott, St. Thos. Hosp.

Branch V. (Hygiene).—V. F. Anderson, Westminster Hosp.; and Edith J. R. Browne, London (R.F.H.) School of Medicine for Women.

Branch VI. (Tropical Medicine).—K. V. Earle, Univ. of Camb. and St. Thos. Hosp.; and E. G. Wilkins, Middlesex Hosp. and London School of Hygiene and Tropical Medicine.

University of Bristol

The degree of M.D. has been awarded to A. C. Fisher for published work.

English Conjoint Board

At the recent final examination of the Board the following candidates were approved in the subjects indicated, but are not yet eligible for the diplomas of the colleges:—

Pathology.—O. B. Alakija, G. W. Alderman, J. D. F. Armstrong, Mary Barker, R. H. Barrett, E. A. Beet, R. H. Bembridge, C. Berens, Lily Black, E. Bolton, E. S. Bompas, G. L. Broderick, J. M. Brown, J. W. F. Brown, L. S. Calvert, P. C. Calvert, G. D. Channell, S. H. C. Clarke, J. C. Coates, W. A. Cobb, J. O. Collin, F. C. Collingwood, S. M. Cornes, B. K. Das Gupta, W. Davidson, D. L. Davies, L. E. C. Davies, W. H. Davies, L. J. D'Souza, J. Diver, H. G. Dowler, J. J. Dubash, P. S. Edgecombe, G. M. Fleming, H. R. W. Franklin, Joyce M. George, W. W. Gilford, E. Gillett, E. Gill-Carey, A. Gomez, A. C. F. Green, J. B. M. Green, L. Greenbaum, K. Hamiduddin, H. E. W. Hardenberg, A. J. Hardy, K. H. Harper, E. W. Hart, C. W. M. Harvey, F. E. S. Hatfield, W. H. Hayes, L. Heasman, R. K. R. Henry, A. G. W. Hill, J. E. Hill, G. T. Holroyd, T. H. Hughes, K. F. Hulbert, C. W. Hutt, G. A. Jackson, T. G. S. James, T. P. N. Jenkins, T. E. Johnson, H. Josephs, M. A. Kader, L. U. Kamm, E. Kaplan, R. G. M. Keeling, A. R. R. Kent, B. S. Kent, F. B. Kiernander, J. D. Kinnear, W. J. Latham, J. Lawson, A. R. Lee, I. Libman, A. B. Lintott, H. R. Loughran, A. A. Lovell, L. G. Lyle, L. McAskie, I. T. McGaw, D. H. Mackay, J. Mackellar, H. K. Meller, P. J. W. Mills, G. D. N. Milne, J. S. Minett, J. G. Mitchell, K. W. Monks, A. G. Moore, F. T. Moore, D. W. Moynagh, J. T. Murray-Aynsley, J. A. V. Nicoll, M. J. O'Donnell, M. G.

O'Flynn, N. O. Paterson, Nora M. Pettitt, W. J. E. Phillips, G. C. L. Pile, F. E. Pitt-Payne, Faith C. Poles, Helen S. Polson, Dorothy S. Pope, M. Price, P. J. Purcell, J. Razonsky, A. Reeves, J. L. D. Roberts, D. W. Rossiter, G. R. Royston, S. Sambandam, D. M. Samuel, H. V. Sankarayya, M. Schalat, G. E. B. Scott, J. S. H. Scott, Marjorie Small, J. I. M. Smith, E. H. J. Smyth, J. B. Spearman, G. C. Steel, D. H. Swayne, R. D. Teare, R. F. Tredgold, R. C. Tudway, J. R. T. Turne, J. Vahrman, G. J. van der Merwe, G. O. Walker, S. Weinstcok, T. E. Whitby, A. M. Williams, H. T. H. Wilson, J. R. J. Winter, Ursula W. Wood, and C. A. Young.

Medicine.—M. A. Ahmad, I. C. Allen, S. Balasingam, E. J. W. Barnard, R. H. Barrett, P. N. Baruah, Agnes Y. Bowie, Josephine H. Campbell, S. S. L. Chiew, Priscilla B. Clark, J. D. Cooper, N. Cruickshank, G. G. Doel, J. J. Dubash, G. H. Ellis, Joan R. Franklin, D. W. F. Gotla, R. L. Hartley, R. A. Hoey, C. A. Hutt, M. Inayat-Ullah, J. I. A. Jamieson, H. G. Jones, D. B. Kulkarni, M. Lipson, H. S. Lohgarh, Ivy M. Massick, F. T. Moore, D. W. Moynagh, Moira Murray, J. A. V. Nicoll, Nora M. Pettitt, Dorothy S. Pope, R. R. Prewer, B. Robbins, W. A. H. Rushton, H. N. Savage, S. K. Sen, D. Singh, R. Srinivasan, J. S. Stuart, F. J. E. Stuhl, J. R. Sweeting, R. F. Tredgold, J. H. Ward, A. G. Waters, H. Weiner, Sheila M. R. Williams, S. L. Williams, and E. G. Williamson.

Surgery.—M. M. Ali, G. A. Armstrong, E. J. W. Barnard, H. F. Barnard, J. E. M. Barnes, F. G. A. Beckett, L. J. Blay, A. W. Bone, J. C. B. Bone, R. E. Bonham-Carter, C. M. Bowker, S. C. Buck, D. H. D. Burbridge, S. S. L. Chiew, T. K. Cooke, H. W. F. Croft, M. Curwen, B. J. Doran, C. H. Drake, T. P. Eddy, T. H. T. Gautby, T. D. Fraser, S. E. Furber, M. Gaba, D. R. Gibson, G. N. St. J. Hallett, R. L. Hartley, A. G. Hemsley, G. H. M. Hemsted, M. C. B. Heyns, B. B. Hickey, W. A. T. Hill, R. J. House, W. Hughes, C. W. Hutt, J. I. A. Jamieson, R. A. Johnson, W. E. Kershaw, F. B. Kiernander, M. Krone, J. W. Lacey, C. Langmaid, B. Lee, M. Lewis, R. G. M. Longridge, R. D. McDonald, K. G. F. Mackenzie, M. Mirsky, N. H. M. R. Monro, R. Mundy, R. O. G. Norman, K. J. O'Connor, T. D. W. O'Flynn, G. W. Palmer, N. O. Paterson, E. N. Pearlman, G. B. S. Pimblett, Faith C. Poles, A. R. Pritchard, C. N. Pulvertaft, Shila G. Ransom, C. O. Ribeiro, Florence G. Richards, O. N. Roussel, J. W. R. Sarkies, J. A. Seymour-Jones, G. C. Steel, B. P. Stone, A. R. F. Thompson, R. G. Tuke, G. J. Van der Merwe, W. M. Van Essen, C. S. Van Heerden, Rosemary C. Walker, J. St. J. F. W. Wallace-Collett, G. Williams, W. H. Wolstenholme, and D. E. Yarrow.

Midwifery.—P. A. Allsopp, G. S. Arnold, W. K. Badgett, F. J. S. Baker, H. H. F. Barns, L. Bass, A. B. Baxter, F. G. A. Beckett, E. A. Beet, E. D. Belbin, A. M. Best, F. A. Bleaden, T. F. Bostock, C. M. Bowker, R. F. Braithwaite, J. M. Brown, I. S. Buchanan, G. L. Burgess, J. C. Busby, L. S. Calvert, H. W. Chaifetz, S. R. Chandra, G. D. Channell, R. Chignell, Priscilla B. Clark, E. P. Clarke, J. W. Clegg, J. C. Coates, H. W. F. Croft, J. E. A. David, D. A. Davies, Phillis Dingle, J. Diver, H. G. Earnshaw, C. H. C. Ferguson, G. M. Fleming, Daireen I. Forster, J. P. Fox, J. E. Garson, R. G. Gibson, W. W. Gilford, D. L. H. Goddard, G. Gray, M. A. Hai, T. A. Hale-Monro, H. E. W. Hardenberg, E. W. Hart, G. A. Hart, E. I. B. Hawes, L. Heasman, B. B. Hickey, J. D. N. Hill, G. T. Holroyd, K. F. Hulbert, W. L. Isaac, G. A. Jackson, S. Jackson, W. H. Jopling, H. Josephs, D. Kendall, A. R. R. Kent, B. S. Kent, W. E. Kershaw, E. E. K. Kilvert, A. I. Kinnear, J. D. Kinnear, D. J. Lapping, L. R. Leask, E. E. Lefeuvre, J. B. Lobo, J. M. Lockett, H. S. Lohgarh, S. W. Longthorne, H. R. Loughran, P. D. Lynch, R. I. Macbeth, G. L. St. A. McClosky, D. H. G. MacQuaide, M. A. Margo, S. C. Mehta, G. D. N. Milne, J. S. Minett, P. D. Mohandirange, F. T. Moore, T. J. Morton, T. P. Myles, M. J. O'Donnell, M. G. O'Flynn, J. D. Ogilvie, W. A. Oliver, Helen M. C. Palmer, S. N. Paranjpe, J. Pemberton, J. W. Pierce, F. E. Pitt-Payne, O. N. Ransford, A. H. M. Richards, G. Rigby-Jones, Annie I. B. Ross, B. M. D. Rosten, K. G. Rotter, J. K. Salmon, L. J. Sandell, M. Schwartz, I. B. Sen Gupta, W. P. Shemilt, D. Singh, M. R. Singh, R. Srinivasan, F. Stansfield, D. E. Stephens, W. H. Stephenson, W. Stoddart, G. K. Taylor, D. T. Thomas, F. B. Thomas, A. R. F. Thompson, R. F. Tredgold, R. C. Tudway, J. R. T. Turner, J. E. Underwood, W. M. Van Essen, J. R. Wardley, R. N. E. Watt, W. R. Welply, C. Weston, H. T. H. Wilson, Louise F Wilson, G. N. Wright, and P. J. M. Wright.

Scottish Conjoint Board

At recent examinations by the board of the Royal Colleges of Physicians and Surgeons of Edinburgh and the Royal Faculty of Physicians and Surgeons of Glasgow, the following candidates were successful :—

F. C. Alexis, Paul Anyos, S. F. Aron, Komarraju Atchamamba, G. B. Beckner, W. M. Bennett, W. J. M. Beveridge, Aaron Caplan, A. S. Chiekrie, N. G. Clements, Michael Cohen, Hans Cohn, Albert Conn, Michael Dinner, A. H. Dobbin, A. H. Elder, I. J. Fernando, Harry Fischgold, J. A. Geerthsen, V. W. C. Gordon, J. E. Greene, H. R. Hagemann, Emmy Hahn, Meyer Hammer, D. T. Herkus, H. K. Hosny, H. N. Katz, T. S. B. Kelly, Ludwig Kleeberg, L. L. Kramer, Johan Kruger, Anna Lewin, Antony Lucas, Ilja Margolin, Ann W. M. Miller, Marjorie B. Morton, O. W. Nelki, C. B. Phillips, B. de F. Pieris, Egon Plesch, Abraham Rabinowitz, P. S. Reisman, L. A. St. L. Richards, Peter Salsberg, N. A. Samuels, M. J. A. Sandrasagra, Abraham Shechtman, H. B. Silverman, Herbert Simon, Simon Smulowitz, O. J. Sokoloff, L. N. Soon, Jack Squire, Hedwig Stern, Kurt Stern, W. P. Steyn, Samuel Stromberg, T. H. Thompson, A. S. Torrance, Ernst Widrich, G. E. W. Winter, and Ilja Wolpert.

Walsall General Hospital

Representatives of workpeople have visited this hospital to see how the money they collect is expended. The two new wards were made possible through the help of the workpeople's contributory fund.

King's College Hospital

Mr. Cecil P. G. Wakeley has been appointed by the council of King's College to be their representative upon the committee of management of King's College Hospital, in the place of Prof. E. Barclay-Smith, M.D., who served in that capacity for twelve years.

King's College Hospital Centenary

In 1939 King's College Hospital will celebrate its hundredth anniversary. It is over twenty years since the hospital moved from its original home in Portugal-street to Denmark Hill, the site of 12 acres being presented by the late Lord Hambleden.

Research Fellowships in Tuberculosis

The Medical Research Council have awarded Dorothy Temple Cross fellowships for the academic year 1935–36 for research in tuberculosis to Mr. G. B. Brook, D.Sc., senior assistant veterinary officer, Derbyshire county council; Dr. J. W. Craig, assistant medical officer, King Edward VII. Sanatorium, Midhurst; and Dr. A. H. B. Rhodes, house physician, Brompton Hospital.

Paddington Medical Society

A meeting of this society will be held on Tuesday, August 13th, at 9 P.M., at the Great Western Royal Hotel, Paddington, W., when there will be a clinical discussion by members on case problems in general practice.

National Hospital, Queen-square

A course of lecture-demonstrations on neurology will be held at this hospital from Oct. 7th to Dec. 6th. It will include demonstrations of anatomy, physiology, and pathology, and demonstrations on post-mortem material at noon; lectures on the principles of neurology and on diseases of the nervous system at 3.30 P.M.; and demonstrations of clinical methods of examination at 5 P.M. A second course will be held from Jan. 27th to March 27th. Further particulars may be had from the secretary of the hospital, Queen-square, London, W.C.1.

Invalid Children's Aid Association

This association will hold a joint conference with the Central Council for the Care of Cripples on the welfare of cripples and invalid children on Nov. 7th and 8th at the Drapers' Hall, Throgmorton-street, London, E.C. The conference will be opened by Sir Kingsley Wood, the Minister of Health, and the first session will be devoted to a discussion of infectious diseases, their after-effects, immunisation, and other preventive measures. The speakers will include Sir John Broadbent, Dr. Matthew Burn, Surgeon-Captain Sheldon Dudley, Dr. J. Alison Glover, and Dr. W. J. Pearson. At other meetings the after-effects of accidents will be discussed, and the speakers will include Dr. H. C. Cameron, Dr. Elizabeth Casson, Mr. S. A. S. Malkin, Dr. H. E. Moore, and Mr. Donald Norris. Further information may be had from the secretaries of the associations, 117, Piccadilly, W.1.

Presentations to Medical Men

On his retirement from the post of principal medical officer of the Welsh Board of Health, Dr. D. Llewellyn Williams received a presentation from the Welsh branch of the Society of Medical Officers of Health, meeting in Cardiff last month under the presidency of Dr. Thomas Evans, of Swansea. Dr. D. Rocyn-Jones, in speaking of Dr. Williams's great services to the public health service, recalled the time when there were only three county medical officers in Wales—Dr. Williams, Dr. W. Williams, of Glamorgan, and himself. Other speakers included Prof. R. M. F. Picken, Dr. Colston Williams, Dr. Dan Powell and Dr. T. B. Smith.—In the city council chamber at Leicester, on July 26th, Dr. C. Killick Millard received presentations and an illuminated address in recognition of his work as medical officer of health. References were made to his unselfishness and generosity and to the magnificent success that has attended his efforts to lower mortality and increase health. In the course of his reply Dr. Millard remarked that if he were dictator the first thing he would do would be to bring in compulsory superannuation.—After 21 years at Ravensthorpe, in Yorkshire, Dr. James A. Stewart is retiring to live at Brighton, and last month a meeting was held to express the respect and affection of the townspeople among whom he has been working. Part of the presentation was made on behalf of the local ambulance brigade, in which Dr. Stewart has successfully trained 200–300 candidates for examination.

NOTES, COMMENTS, AND ABSTRACTS

THE SIGNIFICANCE OF PERSISTENT HIGH BLOOD PRESSURE *

BY L. N. JACKSON, M.C., D.M.

I PROPOSE in this paper to deal with persistent arterial hypertension from the point of view of prognosis, and I have chosen this subject and this particular aspect of it for several reasons. I have chosen it first, because, I think, prognosis is a branch of medicine about which the general practitioner ought to know more than his consultant colleagues, since he has better opportunities of following up cases until they finally perish under his care. Secondly, I have chosen it because I believe that as prognosticians we doctors have a definite civic function to perform, quite apart from any other uses we may have to the community. If we cannot cure a patient we ought at least to be able to forecast with some degree of accuracy what measure of health he is likely to enjoy, and when he may expect to die, so that he may put his affairs in order. My third reason is that I happen to have been interested in essential hypertension for a number of years. It has been a sort of hobby of mine. Just as one man may collect stamps or old china, so may another collect hyperpietics. Finally, I have chosen it because, it seems to me, that many of my own and previous generations in the profession are hazy about the significance of persistent hypertension.

Persistent arterial hypertension nowadays is usually classified as follows :—

1. *Renal hypertension*, the type found in association with certain cases of that variety of Bright's disease usually known as chronic glomerulonephritis.

2. *Non-renal hypertension*, sometimes called essential or benign hypertension, a disease of unknown ætiology which was first differentiated from Bright's disease by Allbutt, and called by him hyperpiesia.

3. *Malignant hypertension*, about which I shall have something to say later.

Let us begin by considering the first group, renal hypertension. What happens to renal hypertensives? How long do they live? Statistics are dull things, so I will refer to them as briefly as possible. In 31 cases of renal hypertension which came to autopsy at the London Hospital, the average age at death was *forty-five*. Renal hypertensives do not make old bones. Why not? What kills them? The cause of death in 84 cases which came to autopsy was as follows :—

1. Uræmia (facile princeps) accounted for	49	cases	(about	60 %).
2. Cerebral hæmorrhage	,,	18	,,	(,,	20 %).
3. Cardiac failure	,,	7	,,	(,,	8 %).
4. Other causes	,,	10	,,	(,,	12 %).

Thus the common fate of the renal hypertensive is to die in the fifth decade of life. The kidney lesion is the nigger in the woodpile. In two cases out of three, the kidney lesion comes to dominate the clinical picture, and the patient dies of renal failure.

Now we come to the second group, the non-renal or essential hypertensives. How long do they live? In 86 cases of essential hypertension which came to autopsy at the London Hospital, the average age at death was found to be ***sixty***, and many of these cases were complicated by other life-shortening diseases such as rheumatic endocarditis. What do essential hypertensives die of? The cause of death in 123 autopsy cases was found to be :—

1. Cardiac failure	56	cases,	that is	45 % (nearly half).
2. Cerebral hæmorrhage ..	33	,,	,, ,,	27 %
3. Other causes	34	,,	,, ,,	28 %
Uræmia, nil.				

So much for hospital records. What about cases observed in general practice? In 20 cases of essential hypertension dying under our care, the average age at death was nearly ***seventy***. I have 26 patients who have been under observation for periods varying from fourteen years to two months and whose average age is nearly ***sixty-nine***. This series includes a young man of twenty-five in whom the diagnosis is doubtful; without him, the average age would be *seventy-two*.

Thus, the fate of the non-renal hypertensive is very different from that of the renal. The subject of uncomplicated essential hypertension may reasonably expect to live into the seventh or even the eighth decade. The kidneys, though they share in the arterio-sclerotic process, are not seriously functionally impaired. Death occurs from cardiac failure or cerebral hæmorrhage, and *not from uræmia*.

We therefore have to deal with two morbid conditions which when first seen may be clinically almost identical but in which the prognosis is very different. Obviously the differential diagnosis is worth making. How is it to be done? Sometimes it is so easy that a policeman, or perhaps a surgeon, can make it. In other cases it is so difficult as to defy even a general practitioner. It must be admitted at once that, in doubtful cases, repeated observation at infrequent intervals may be necessary before the diagnosis can be established with anything like certainty. Remember, the blood-chemistry will not help, for by the time that a high blood-urea indicates renal insufficiency the diagnosis of renal hypertension can be made by looking at the patient's face. To wait for a rising blood-urea before making the diagnosis is like waiting for fæcal vomiting before diagnosing acute intestinal obstruction.

Renal or Not ?

When confronted by a hypertensive patient, what are the points that will help us to decide whether he is suffering from renal or non-renal hypertension? No single one of them is infallible though some are more suggestive than others. Neither condition is rare, though there is no doubt that essential hypertension is far commoner than renal hypertension.

First, the *history*. If there has been an illness in the immediate or remote past suggesting acute glomerulo-nephritis, or other acute infection, such as scarlet fever, which is liable to kidney complications, suspect renal rather than non-renal hypertension. Secondly, the *age-incidence*. Renal hypertension is a disease of young middle-age, say thirty to forty-five. Essential hypertension, so far as we know, is not usually present before the fifth decade. Therefore, in a young subject, say under thirty, be very chary of diagnosing essential hypertension even when no abnormality is found other than a persistently raised blood pressure. Thirdly, the *appearance* of the patient may help. The renal hypertensive is apt to be pale, thin, and lethargic; the essential hypertensive is apt to be ruddy, often fat, and energetic. Fourthly, as to the *height of the blood pressure*. In renal hypertension, blood pressures, both systolic and diastolic, tend to run higher than in non-renal hypertension. Moreover, in renal hypertension, blood pressures tend to rise as time goes on, whereas the non-renal may be stationary or nearly so for many years. There are, however, plenty of exceptions to this rule.

Cardiac hypertrophy is common to both conditions and is of no importance in differential diagnosis. The same applies to arterio-sclerosis. Arterio-sclerotic changes in the retinal vessels occur in both conditions, and I have never met an ophthalmic surgeon who would commit himself to a differential diagnosis on the retinal picture alone, though there seems to be evidence that multiple flame-shaped hæmorrhages and exudate speak in favour of renal hypertension, and are of sinister prognostic significance. I have

* A paper read before the Exeter Medico-Chirurgical Society on April 25th, 1935.

no doubt that hæmorrhages do sometimes occur from the arterio-sclerotic retinal vessels of non-renal hypertensives, but often they are solitary and clear up.

Fifthly, the *urine*. Fixation of the specific gravity at a low level, say 1010, is an important point in favour of renal hypertension. Twenty-four hourly specimens are hard to come by in general practice. The patients are apt to send up all the urine passed in twenty-four hours, which sometimes entails their hiring a cart to convey it to the surgery. A good substitute method is that described by Fishberg.

"About 6 o'clock of the evening before the test, the patient has his usual supper, which should not contain more than at most 200 c.c. of fluid, but in which it is advantageous to have a considerable amount of protein food. After this he neither eats nor drinks anything until the test is over. Before retiring, he empties his bladder; this urine is discarded as is any urine passed by the patient during the night. On wakening in the morning he passes urine which is kept in a separate bottle. He remains in bed and again empties his bladder one hour after awakening. He is then up and about (if able to do so) for an hour and at the end of this time voids into a third bottle. Each of the three bottles should be labelled with the time when the urine was passed. Thus, if the patient awakens at 8 o'clock the three specimens will be passed at 8, 9 and 10 o'clock. The patient has had sixteen hours in which to "concentrate" with little inconvenience. In private practice with morning surgery hours, it is also a convenience that the patient can bring the three specimens to the surgery soon after 10 o'clock. The specific gravity of each of the three specimens is then taken. If kidney function is unimpaired, the specific gravity of at least one of the specimens will exceed 1022, often going as high as 1032. Older individuals often do not concentrate as well as the young. In very severe impairment of renal function the maximum specific gravity is only 1010, and in intermediary cases figures between these extremes are obtained. In patients with true uræmia the maximum is under 1020 and usually much closer to 1010." From "Hypertension and Nephritis" by A. M. Fishberg. London, 1930, p. 51.

Polyuria is, I think, of no great significance. Both renal and non-renal hypertensives may be polyuric at least until renal or cardiac failure develops in the former, or cardiac failure develops in the latter. Albuminuria is fairly constant in renal hypertension and albumin is often present in large amount; it is inconstant and scanty in essential hypertension in the absence of chronic myocardial failure.

The presence of casts is not of much help. Granular casts tend to be more abundant in renal than in non-renal hypertension. Red blood-cells and leucocytes on the other hand, if present in any number, speak for renal hypertension, assuming, of course, that the urinary tract is otherwise healthy, and free from such conditions as pyelitis or renal calculus. To exclude leucorrhœal contamination catheter specimens are advisable in women.

Two Typical Cases

Perhaps I may shortly quote a typical example of each. First a case of renal hypertension.

A tall, puffy, pasty boy of seventeen, had measles followed by broncho-pneumonia in infancy. At the age of nine he had a short febrile illness. A cloud of albumin was found in the urine which was clear within a week. At the age of twelve he was sent home from school with a temperature of 102° F. and an enlarged tender right post-auricular gland. His eyelids were puffy and the urine showed a heavy cloud of albumin, which persisted as a faint haze. At the age of fourteen he had a cold followed by persistent pyrexia, up to about 100° and highest at midday. He had large tonsils, puffy eyelids, and a cloud of albumin. The blood pressure was 150/100. The fundi were normal. The specific gravity of the urine was 1010. Later a trace of blood appeared in the urine. Albuminuria and pyrexia persisted. His tonsils were removed without improving his general condition. Meanwhile his cardiac apex had moved out to the left.

He was investigated in hospital. Blood cultures and agglutination reactions were negative for the typhoid group and *Brucella abortus*. His blood-urea in April, 1932, was 53 mg. per 100 c.cm. and during his stay in hospital he showed renal inadequacy in the urea-concentration test. In November, 1933, the urine had a specific gravity of 1018, contained a heavy cloud of albumin, and microscopically showed leucocytes, red cells, hyaline, granular and leucocytic casts. The blood count showed a slight secondary anæmia. Since then he has persistently shown mild pyrexia. The urine examined on twelve occasions has always contained albumin, varying from a heavy cloud to a 1/12 volume. The specific gravity of twenty-four hourly specimens of urine has varied between 1020 and 1010. The blood pressure is rising steadily, and recently has always been in the region of 165/75.

I think that there is no reasonable doubt that this boy is suffering from chronic glomerulonephritis of the hypertensive type, and that he is doomed to die young, and most probably of uræmia.

Now compare and contrast that case with the following:—

Five years ago an old lady of seventy-four, complained of a blind spot in her right eye which developed quite suddenly and was like a tea-cosy in shape. She was seen by Mr. P. D. Warburton who observed a retinal hæmorrhage in the macular region. Mr. Ransom Pickard saw her about a month later. His report was as follows: "At the right macula there was a circular patch, deep red in colour, with a border of grey pigment. At the edge of this below was a small hæmorrhage. The right fundus showed slight cutting of the retinal veins by their arteries, but was otherwise normal." Except for this blind spot she felt quite well, though she confessed to slight dyspnœa on exertion. There was no œdema, no headache or vertigo, and in fact no other symptom. The urine had a specific gravity of 1011, and there was a haze of albumin. The blood pressure was 220/140. Two years ago she had an attack of abdominal discomfort and flatulence, and also attacks of tightness in the chest at night which made breathing difficult, and lasted for perhaps an hour or two. Her apex-beat was observed to be just outside the nipple line. These symptoms rapidly subsided with rest, and when seen about a month ago at the age of seventy-nine, she said she felt very well. There was no headache, vertigo, or tinnitus. Her hearing was fair. There was slight dyspnœa and palpitation on exertion, but she could hurry upstairs. Her eyesight was now good. The blind spot had cleared up gradually, taking about a year to do so. There was no œdema. Her blood pressure was 200/140. The radial artery was just palpable, and the apex-beat just outside the nipple. She looked extremely well. The urine was normal, the specific gravity being 1020, and microscopically showed nothing except a few oxalate crystals, epithelial cells, and amorphous urates.

Here is a patient with essential hypertension who feels very well at the age of seventy-nine, and who, when she does die, if indeed she ever does, will die of progressive heart failure or cerebral hæmorrhage, *but not of uræmia*.

Does Malignant Hypertension Exist?

Now what is this thing called malignant hypertension? Some competent clinicians, notably Fishberg and Volhard, in America, whilst agreeing that 90 per cent. of essential hypertensives never show impaired renal function, maintain that the remaining 10 per cent. show evidence of renal destruction and die of uræmia. They say that, in these cases of essential hypertension, which behave normally for years or even decades, a malignant phase arises leading to rapid death. They claim to find at autopsy on these cases a necrosis and endarteritis of the renal arterioles which is followed by acutely progressive renal insufficiency. Other clinicians and pathologists disagree. Dr. Dorothy Russell, who can speak with authority on the pathology of Bright's disease, says that these cases of so-called malignant hypertension are merely cases of exceedingly chronic glomerulo-nephritis. She maintains that these vascular lesions in the kidney are part and parcel of Bright's disease, wrought by

the same toxin which produces the glomerular changes. She adds that these same vascular lesions may occur in the early stages of Bright's disease before there is any question of hypertension.

Another argument against the existence of malignant hypertension is the difference in age-incidence. Malignant hypertension so-called occurs between the ages of thirty and forty. Essential hypertension arises between forty and sixty. This surely argues against malignant hypertension being a complication of essential hypertension.

Personally I am on the side of the pathologists. I think these cases in which malignant hypertension is said to supervene on essential hypertension are really mistakes in diagnosis, and that the case was really one of chronic glomerulo-nephritis—i.e., renal hypertension—all along. In my humble opinion, if one sees uræmia developing in a case which one has diagnosed as essential hypertension, the best way out is to admit to oneself (if to nobody else) that the original diagnosis was wrong, and not talk about malignant phases in the hope of laughing it off.

Morbid Adventures

It is probably true to say that, once established, essential hypertension seems to be permanent in the majority of cases, though there is evidence to show that hypertension arising during pregnancy and at the menopause sometimes disappears spontaneously.

Another interesting point is the extraordinary stability of the blood-pressure readings, both systolic and diastolic, in the majority of cases, except when the heart is failing. In some of my cases which have been under observation for years, the variations in individual blood pressures are extremely slight. A man whose blood pressure was 190/125 fourteen years ago, had a blood pressure of 185/110 when last seen a few weeks ago. A woman whose blood pressure was 210/115 nine years ago, when examined recently had a blood pressure of 200/115. The height of the blood pressure seems to bear no relation to the severity of the symptoms. A man with a blood pressure of 270/150 suffered no discomfort except for occasional slight headaches, and was able to do heavy manual work for years. Another man with a blood pressure never higher than 185/105 is permanently miserable with tinnitus, vertigo, and headache.

Essential hypertension is often said to be a disease of civilisation. The hardworking, hard-driving, hard-drinking business man is especially prone to it. I can only say that it is extremely common among the peasantry of Devon, some of whom have never hurried in their lives.

Apart from death in the seventh or eighth decade, various other morbid adventures are apt to befall the subject of essential hypertension. *External hæmorrhages* for example are very common, especially epistaxis which has occurred in 11 of my 46 cases, and hæmoptysis which has occurred in 3. Hæmatemesis and melæna from hypertension no doubt occur, but I have not encountered them, though I daresay that hæmorrhage from a gastric ulcer in one case was aggravated by coexisting hypertension. As a rule these patients seem to be rather refreshed by hæmorrhages, as by venesection; though, of course, the effect of hæmorrhage on the permanent level of the blood pressure is negligible. External hæmorrhages are not always, however, to be looked on with complaisance. In one of my cases a severe hæmoptysis immediately preceded death and, in another, severe epistaxis very nearly resulted in death from the hæmorrhage.

Diabetes mellitus is a well-recognised complication of essential hypertension. I have seen it in five cases, three of which have died. The prognosis, however, does not appear to be seriously affected by this complication unless insulin is given, in which case the patient does badly, since arterio-sclerotic vessels cannot stand it. A woman, aged fifty-three, with a blood pressure of 250/150 and chronic myocardial failure developed glycosuria. She was given insulin 10 units twice daily, and died suddenly four months later.

Cerebral hæmorrhages have been the sole or a contributary cause of death in at least 9 of my cases. Non-fatal strokes, probably due to small hæmorrhages, and ranging from complete hemiplegia to slight monoparesis, have occurred in 7 patients—four of these are still alive. One of them, a woman aged fifty-three, had a hemiplegia sixteen years ago, and is now able to get about with no more disability than a slight limp. Her B.P. is 200/115. Another woman, aged eighty-three, suddenly developed a paresis of her right upper limb nine years ago. She is now quite well, except for a slight clumsiness of her right hand. Her B.P. is 200/120. I have seen herpes zoster twice. This may be mere chance or due to small hæmorrhages in spinal vessels which have become sclerosed as a result of prolonged high pressure. Persistent hypertension though an undoubted cause of arterio-sclerosis is by no means the only, nor indeed, the most potent one. The *pipe-stem radial artery* appears to occur rather in what Allbutt called decrescent arterio-sclerosis—i.e., lean old men who have low blood pressures, small pulse pressures, and small atrophic hearts.

Gout has occurred only once in my series. There is no reason to believe that gout and hypertension have anything more in common than a tendency to occur in the same type of person.

Chronic *cholecystitis* and hypertension seem to have more in common. Cholecystitis occurred in 5 of my patients, all of whom have died. Three of these were not considered fit for operation. One died very shortly after operation, and one several years after a successful cholecystectomy. This was the patient already referred to who died suddenly after hæmoptysis. It should be mentioned in passing, that simple hypertension per se is no contra-indication to giving a general anæsthetic.

Mild *general infections* are stood as well by essential hypertensives as by anyone else, but severe infections try them more than they do normal persons. An old woman of seventy-three went fairly well through a lobar pneumonia despite a B.P. of 190/115. Shortly afterwards, however, she developed signs of progressive heart failure. A man, aged forty-nine, with a B.P. of about 260/150 lived almost symptomless and was able to do hard manual work for eight years, but died in twenty-four hours from broncho-pneumonia.

There is no doubt that *cardiac failure*, or cardiac defeat as Allbutt called it, is the commonest cause of death in essential hypertension. Chronic myocardial failure is, or has been, present in at least 15 of my cases. Other cardiac disease accounts for another 7. Angina has occurred in 4, coronary embolus probably in 2, and Stokes-Adams disease in 1.

In conclusion, then, my advice to intending centenarians is, on the whole, to avoid hypertension if you can. If you cannot, choose the non-renal rather than the renal, and you need not despair.

THE HEAD OF OLIVER CROMWELL[1]

Canon Horace Wilkinson is in possession of a head impaled upon a rusted iron spike fixed on a decayed oak pole. This head is reputed to be that of Cromwell, and for a century past has been the subject of keen controversy, but until recent years no single trustworthy measurement of it had been undertaken, nor had any attempt been made to fit it to any of the known portraits of Cromwell. Canon Wilkinson, with much public spirit, gave permission to Prof. Karl Pearson and Mr. G. M. Morant, D.Sc. (1) to retain the head long enough to carry out a comparison with the available busts, masks, and portraits of

[1] The Portraiture of Oliver Cromwell, with special reference to the Wilkinson Head, by Karl Pearson, F.R.S., and G. M. Morant, D.Sc. Issued by the Biometrika Office, University College, London, and printed at the University Press, Cambridge. 1935. Pp. 116. 36s.

Cromwell; and (2) to state freely the conclusions reached as the result of their investigations.

The anatomical studies undertaken have been enriched by a wealth of historical and antiquarian information collected on the subject. Cromwell died at 3 P.M. on Sept. 3rd, 1658, aged 59. There appear to have been an autopsy and an embalmment. The authors suggest that the autopsy may have taken place soon after death from a suspicion of poison, and the embalming on the following day. As the brain was examined and apparently weighed, there can be little doubt that the skull cap was sawn off. At the autopsy the vessels of the brain are said to have been "overcharged," and the weight is said to have been 6¼ lb.—a figure which the authors reject as an exaggeration, the authority for the statement being far from clear.

An attempt was made, apparently with success, to give him the greatest funeral that had been seen in England; its cost was estimated as not more than £80,000. The effigy was adorned with crown, orb, and sceptre. This was probably one of the chief reasons for the subsequent (political) proceedings.

On May 25th, 1660, Charles II. landed in England, and ten days before that the House of Commons ordered that "John Bradshaw deceased, late Sergeant at Law, be one of those that shall by Act of Parliament be attainted of high treason for murthering of the late King's Majesty." The same order was made concerning Oliver Cromwell, Henry Ireton, and Thomas Pride deceased, and on Dec. 6th the House ordered that the bodies be taken out of their graves and drawn on a hurdle to Tyburn where they were to be hanged and then buried under the gallows. On Dec. 8th the Lords amended the order in the sense that the bodies should be hanged up in their coffins before burial. This "post-mortem" execution was carried out on Jan. 30th, 1661, the anniversary of the execution of Charles I. The sergeant-at-arms appears to have disregarded the order of the Lords and to have permitted the executioner to remove the bodies from their coffins for the hanging. Cromwell's body was encased in six layers of green cerecloth which made the task of the executioner who had to remove the head very difficult; according to an eye-witness he had to make eight cuts before he got the head off. The bodies were tumbled together into a pit already prepared beneath the scaffold; the heads were removed and placed over the south end of Westminster Hall, where Pepys saw them on Feb. 5th.

Applying this and other information to the Wilkinson head Karl Pearson and Morant show that it possesses a number of peculiar characteristics that go far towards establishing it as the genuine head of Cromwell. In the first place the head shows the circular saw cut made at the autopsy in order to remove the brain. Secondly, the head had been embalmed before decapitation, and had been cut off in the crudest possible manner: the first blows with the axe missed the vertebral column and later blows several centimetres further down left four vertebræ attached to the skull. The colour of the hair on the skull agrees with that of Cromwell's hair. The place where his celebrated wart was can still be seen and, lastly, careful anatomical measurements of the skull are compatible with those of the death mask and portraits of Cromwell. The authors found that a skiagram of the Wilkinson head showed the presence of a number of whitish spots chiefly on the frontals and parietals and sought the opinion of Sir Arthur Keith without informing him of the possible identity of the head. Sir Arthur expressed the view that they were Pacchionian depressions and added that: "It should be the skull of an oldish person and the bone formation is not normal. The condition is one of those classed as osteophoresis. I have seen the condition in the skulls of the insane." The authors add that in their opinion Cromwell was certainly not insane, but did suffer from a religious monomania.

The beautiful reproductions of the various portraits and miniatures of Cromwell greatly enhance the value of this book. Now that the identity of the skull is practically certain, might it not be reinterred—e.g., beneath Cromwell's statue outside Westminster Hall?

SOCIAL HYGIENE

THE value of the work done by the British Social Hygiene Council has lately been brought before our readers both by an appeal (March 23rd, pp. 688 and 702) and by reports of the proceedings of the seventh Imperial congress, held last month in London. The need for sympathy and support is again made clear by the annual report.

The year saw the first appearance of the Empire Social Hygiene Year Book (reviewed in our columns in September), which includes, besides particulars of the health services and vital statistics of the Empire, a careful survey of the problems of marriage, child welfare, delinquency, venereal diseases, tuberculosis, mental disorder and allied problems throughout the world, and also offers a number of essays on such subjects as biological studies in the universities and training colleges of the Empire, juvenile delinquency in the Dominions and Colonies, international aspects of the film, the social work of the League of Nations, and a study in comparative legislation. A second volume of this useful work of reference has now been published.

The report itself particularly emphasises the need of determined efforts to prevent inherited disease, and stresses the importance of the labours of almoners and trained social workers, who are, unfortunately, as yet available in less than a quarter of the treatment centres. Among the many subjects which have engaged the activities of the Council during the year are the welfare of members of the mercantile marine, sex delinquency in girls and general delinquency in boys, and the increase in tuberculosis and venereal disease in Bechuanaland. The sub-committee which has prepared a memorandum on marriage recommends special preparation for those about to be married, including instruction in the physiology and psychology of the married state. Voluntary submission to medical examination before marriage is also advocated. Since the only way of reaching those intending marriage is through ministers of religion and registrars, the coöperation of those people is essential, and the council proposes to call a conference and put the problem before them. The council is also using its influence to promote the appointment of trained married men and women probation officers to handle separation cases and conciliation proceedings in connexion with the courts. The medical advisory board is considering the whole question of securing the help of medical psychologists for magistrates.

NEW PREPARATIONS

OSTOCALCIUM TABLETS.—The conditions that are now recognised to call for the exhibition of calcium are receiving wide attention, directed especially towards the provision of salts of calcium in a readily assimilable form. The tablets, manufactured by Glaxo Laboratories, (56, Osnaburgh-street, London, N.W.), each contain grs. 7½ of calcium sodium lactate in combination with 500 international units of Ostelin vitamin D (Calciferol G.L.). The advantages claimed for the double calcium salt are that it is more palatable than other salts of calcium, and that the addition of calciferol renders assimilation more simple. The tablets are recommended for use in all conditions to which calcium prophylaxis is applicable as in allergic disorders, or to compensate for undue calcium drain. The Glaxo Laboratories have also added to their preparations CALCIUM LEVULINATE, which in the forms of 10 and 15 per cent. sterile aqueous solution of the calcium salt of levulinic acid, has been found useful for administration by injection.

ERGOMETRINE. (Allen and Hanburys Ltd., London, E.2, and British Drug Houses Ltd., London, N.1).—The isolation of ergometrine, an alkaloid of ergot, was described in the *British Medical Journal* of March 16th

last, by Mr. H. W. Dudley, F.R.S., and Dr. J. Chassar Moir. Other references to the remarkable drug have appeared in medical literature, indicating that ergometrine may establish a claim to be an active principle of great practical importance, appearing indeed to have the action for which ergot was originally introduced into obstetrical and gynæcological practice. Ergometrine prepared in the laboratories of Messrs. Allen and Hanburys has been found to exhibit the characteristic effects of the crude drug, it is indicated therefore in all cases where ordinary ergot is indicated but might have the disadvantage of nauseating the patient. Messrs. Allen and Hanburys supply a sterilised solution in double ended ampoules, to meet employment by injection or by mouth.

The British Drug Houses have placed on the market ergometrine in tablet form for oral administration and samples are available for practitioners.

Appointments

DAVISON, GEORGE, M.D. Durh., has been appointed Medical Registrar at the Royal Victoria Infirmary, Newcastle-upon-Tyne.

KELLETT, C. E., M.D. Camb., M.R.C.P. Lond., Medical Registrar at the Royal Victoria Infirmary, Newcastle-upon-Tyne.

OSBORNE, R. P., M.B. Manch., F.R.C.S. Eng., Resident Surgical Officer at Park Hospital, Davyhulme, Manchester.

PHILIP, J. F., M.B. Aberd., Senior Resident Officer at Aberdeen Royal Infirmary.

Certifying Surgeon under the Factory and Workshop Acts: Dr. H. G. YOUNG (Hatfield, Hertford); Dr. R. A. F. CREET (Ripley, Surrey); and Dr. D. L. FREW (Greenlaw, Berwick).

London County Council Hospital Staff.—The following appointments, promotions and transfers are announced. A.M.O. (I.) and (II.) and assistant medical officer Grades I. and II.:

CRAWFORD, D. K., F.R.C.S. Edin., A.M.O. (I.), St. Mary, Islington (has since resigned);
BEATTIE, D. A., F.R.C.S. Eng., A.M.O. (I.), Fulham;
MACKENZIE, E. F., M.B. Sydney, A.M.O. (II.), St. James'.
SINGER, J. P., B.A. Camb., M.R.C.S. Eng., A.M.O. (II.), St. George-in-the-East.
ROBINSON, M. H. B., M.B. Melb., F.R.C.S. Eng., Senior A.M.O. (II.), St. Charles';
GISSANE, W. C., M.B. Sydney, F.R.C.S. Eng., Senior A.M.O. (II.), St. James';
DEVIN, C. H., M.R.C.S. Eng., A.M.O. (I.), St. Luke's, Chelsea;
SMITH, D. W. G., M.B. Edin., A.M.O. (I.), St. Giles';
WILKIE, D., M.D., F.R.C.S. Edin., Senior A.M.O. (II.), St. Pancras.

Vacancies

For further information refer to the advertisement columns

Aberdeen University.—Lecturer in Morbid Anatomy in Dept. of Pathology. £400.
Aylesbury, Royal Buckinghamshire Hospital.—Second Res. M.O. At rate of £150.
Barnsley County Borough.—M.O.H., &c. £900.
Bath, Royal United Hospital.—H.S. and H.P. Each at rate of £150.
Birmingham, Ear and Throat Hospital.—Third H. S. At rate of £150.
Birmingham, Little Bromwich Hospital for Infectious Diseases.—Jun. Res. M.O. £300.
Birmingham United Hospital.—First Asst. for Neurological Dept. £200.
Birmingham and Midland Eye Hospital.—H.S. At rate of £130.
Bolton Royal Infirmary.—Res. Surg. O., also Asst. Res. Surg. O. £250 and £200 respectively.
Bradford, Grassington Sanatorium.—Asst. Res. M.O. £175.
Bradford Royal Eye and Ear Hospital.—H.S. £160.
Brighton, Royal Alexandra Hospital for Sick Children.—H.S. £120.
Brighton, Sussex Eye Hospital.—Hon. Clin. Asst.
Cardiff, King Edward VII. Welsh National Memorial Association.—Half-time Asst. Tuber. O.'s. Each £250.
Cardiff, University College of South Wales, &c.—Asst. Lecturer in Dept. of Physiology. £400.
Chelmsford and Essex Hospital.—H.P. At rate of £150.
City of London Hospital for Diseases of the Heart, &c., Victoria Park, E.—H.P. At rate of £100.
Croydon Mental Hospital, Upper Warlingham, Surrey.—Sen. Asst. M.O. £600.
Dewsbury and District General Infirmary.—Sen. H.S. £200.
Doncaster Royal Infirmary.—H.S. to Eye and Ear, Nose, and Throat Depts. £175.
Durham County and Sunderland Eye Infirmary.—H.S. £350.
Fareham, Hants, Knowle Mental Hospital.—Jun. Asst. M.O. £350.
Glasgow, Lightburn Joint Hospital, Shettleston.—Res. Physician. £350.
Greenwich Metropolitan Borough.—Jun. Asst. Maternity and Child Welfare M.O. £500.
Hove General Hospital, Sussex.—Res. M.O. At rate of £150.
Huddersfield, Storthes Hall Mental Hospital, Kirkburton.—Fifth Asst. M.O. £350.
Hull Royal Infirmary.—Third H.S. At rate of £150.
Kent and Canterbury Hospital.—H.P. At rate of £125.
Lancaster Royal Infirmary.—Jun. H.S. At rate of £130.
Lincoln, Bracebridge Mental Hospital.—Deputy Med. Supt. £700.
Lincoln, The Lawn.—Asst. M.O. £300.
Liverpool, Alder Hey Hospital.—Res. Asst. M.O. £200.
Liverpool Heart Hospital.—H.P. At rate of £100.
London Homœopathic Hospital, Great Ormond-street, W.C.—Gynæcological H.S. At rate of £100.
Macclesfield General Infirmary.—Second H.S. £150.
Manchester Babies' Hospital, Burnage-lane, Levenshulme.—Sen. Res. M.O. At rate of £125.
Manchester Ear Hospital, Grosvenor-square, All Saints.—H.S. At rate of £150.
Middlesbrough, North Riding Infirmary.—Third H.S. £125.
Middlesex Education Committee.—Teacher in Anatomy 2 gns. per session.
Miller General Hospital, Greenwich-road, S.E.—2 Cas. O.'s. Each at rate of £150. H.P. and H.S. Each at rate of £100.
Newcastle-upon-Tyne, Hospital for Sick Children.—H.P. or H.S. At rate of £100.
Northampton General Hospital.—H.S. At rate of £150.
Northumberland C.C.—Asst. County M.O.H. £500.
Norwich, Norfolk and Norwich Hospital.—Cas. O. £120.
Nottingham General Hospital.—H.S. to Ear, Nose, and Throat Dept. Also Casualty Officer. Each at rate of £150.
Plymouth, City General Hospital.—Asst. M.O. Also Jun. Asst. M.O. £300 and £250 respectively.
Plymouth, Prince of Wales's Hospital.—H.P. At rate of £120.
Portsmouth Royal Hospital.—H.P. At rate of £130.
Post Office (Western District).—Medical Officer. £500.
Preston and County of Lancaster Royal Infirmary.—H.S. £150.
Princess Louise Kensington Hospital for Children, St. Quintin-avenue, Kensington, W.—H.S. At rate of £100.
Reading, County Borough, Battle Hospital.—Res. Asst. M.O. £300.
Rochdale Infirmary and Dispensary.—Jun. H.S. £200.
Rotherham Hospital.—Cas. H.S. £150.
Royal Chest Hospital, City-road, E.C.—Med. Reg. £50.
Royal College of Physicians, Pall Mall East, S.W.—Milroy Lect.
St. Bartholomew's Hospital, E.C.—Dental H.S. At rate of £80.
St. Helens County Borough.—Asst. M.O.H. £500.
St. Paul's Hospital for Diseases of the Genito-Urinary Organs, &c. Part-time Pathologist.
Sheffield Royal Infirmary.—Second Asst. Cas. O. At rate of £80.
Shrewsbury, Royal Salop Infirmary.—Two Res. H.S.'s. Each at rate of £160.
Southampton Free Eye Hospital.—Locum Tenens Ophth. H.S. £6 6s. weekly.
South-Eastern Hospital for Children, Sydenham, S.E.—Two Res. M.O.'s. Each at rate of £100. Also Hon. Pathologist. £50.
Taunton and Somerset Hospital.—H.P. and H.S. Each at rate of £100.
Torquay, Torbay Hospital.—Hon. Surgeon.
University of London.—Graham Scholarship in Pathology. £300. Also William Julius Mickle Fellowship. £200.
Ventnor, Isle of Wight, Royal National Hospital for Consumption, &c.—Jun. Asst. Res. M.O. At rate of £300.
Warwick, King Edward VII. Memorial Sanatorium, Hertford Hill.—Jun. Asst. M.O. At rate of £200.
Wimbledon Hospital, Thurstan-road, S.W.—Res. M.O. At rate of £150.
Wolverhampton, Prestwood Sanatorium.—Asst. Res. M.O £400.
Wolverhampton, Royal Hospital.—H.S. for Fracture and Orthopædic Dept. At rate of £100.
Woolwich and District War Memorial Hospital Shooter's hill, S.E.—Res. M.O. £175.

The Chief Inspector of Factories announces vacancies for Certifying Factory Surgeons at Troon (Ayrshire), Rothes (Morayshire), Caerleon (Monmouthshire), and Milborne Port (Somerset).

Births, Marriages, and Deaths

BIRTHS

BROWN.—On July 27th, at Selkirk, the wife of John Scott Brown, M.B. Edin., Uganda Medical Service, of a son.
LAW.—On July 30th, at Devonshire-place, the wife of Frank W. Law, F.R.C.S. Eng., of a daughter.
SMITH.—On July 28th, at Eton-villas, N.W., the wife of K. Shirley Smith, F.R.C.P. Lond., of a son.
TINCKER.—On July 30th, at Painswick, the wife of Surg. Lt.-Comdr. R. W. Holden Tincker, M.R.C.S. Eng., R.N.V.R., of a daughter.

MARRIAGES

WINTER—RICHARDSON.—On July 31st, at Newcastle, Lewis Bland Winter, M.D. Camb., Ipswich, to Ella, only daughter of Mr. J. G. Richardson, of Newcastle-on-Tyne.

DEATHS

BIGGS.—On July 28th, M. G. Biggs, M.D. Durh., of Rottingdean Heights, aged 86.
FARIE.—On August 5th, at Wimbledon Hill, S.W.19, Gilbert John Farie, M.C., M.B. Edin., in his 54th year.
MCCALDIN.—On August 3rd, at Wymeswold, Cecil McCaldin, F.R.C.S. Edin., of Nottingham.
NASH.—On August 2nd, suddenly, at Bedford, Walter Gifford Nash, F.R.C.S. Eng., aged 72.
NEVILLE.—On July 31st, at Maidenhead, after a long illness, Thomas Neville, M.D. R.U.I., aged 85.
RICE.—On July 31st, at Lower Hellesdon, Norwich, David Rice, M.D. Brux., M.R.C.S. Eng., D.P.H., aged 64.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.